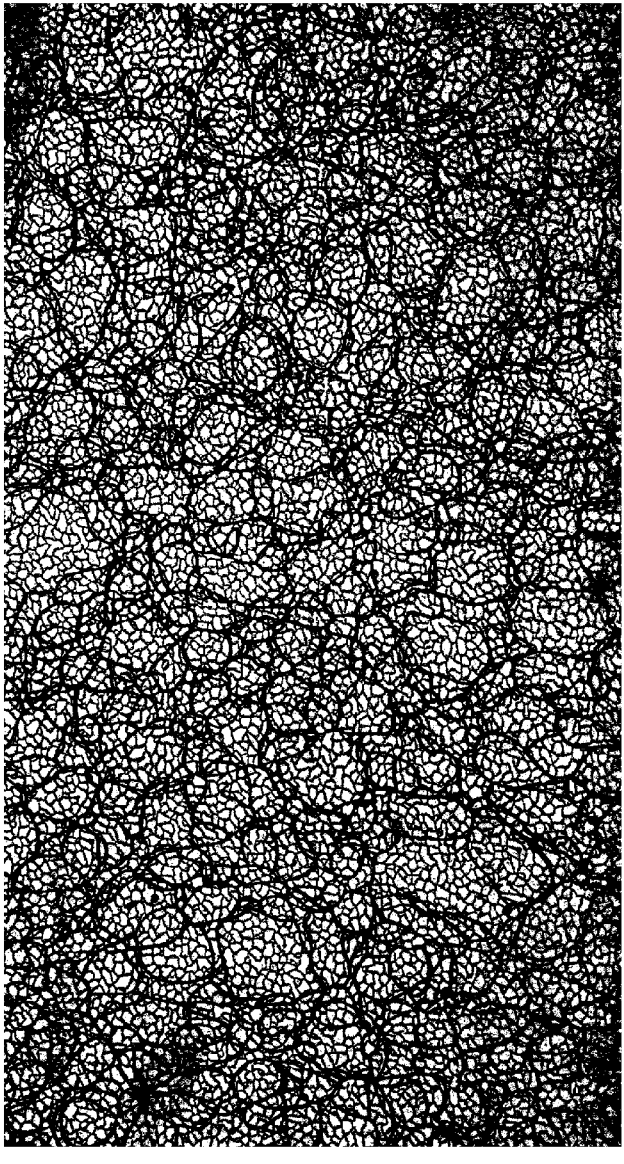
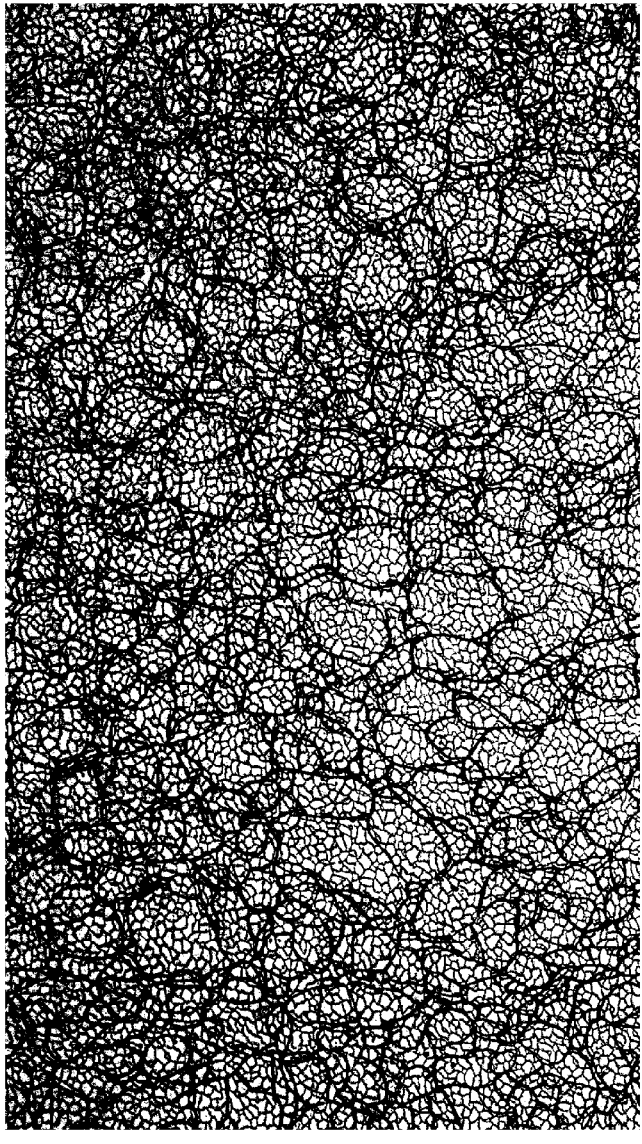




2—GENERAL AND PHYSICAL CHEMISTRY

GEORGE L. CLARK

Ph.-A. Guye. ANON. *J. chim. phys.* **20,** 1–17(1923).—Biography with portrait. E. H.

Edward Williams Morley. O. F. TOWER. *Science* **57,** 431–4(1923).—Obituary. E. H.

Research policies in France, England, the United States, and Germany. J. H. FRYDLENDER. *Rev. prod. chim.* **26,** 73–80, 145–52(1923). A. PAPINEAU-COUTURE

The contents of the chemistry laboratory course. H. E. BROWN. *Gen. Sci. Quarterly* **7,** 203–11(1923).—A course for high schools is described. E. H.

The development and use of standards for reagent chemicals. W. D. COLLINS. *Ind. Eng. Chem.* **15,** 529–30(1923).—Careful testing of reagents by the consumer is advised in preference to further amplification of existing procedures. C. C. DAVIS

Modern theories of the maintenance of solar heat. ALEX. VÉRONNET. *Rev. sci.* **34,** 165–71(1923).—A review of physical and chem. theories. E. H.

The first knowledge of red phosphorus. R. WINDERLICH. *Chem.-Ztg.* **47,** 297 (1923).—The discovery is credited to A. Vogel in 1813. E. H.

X-ray analysis of crystal structure. A bibliography. C. H. HALL, JR. *Maryland Acad. Sci. Bull.* **2,** 87–8, 91–2(1922); **3,** 15–6(1923). E. J. C.

Density determinations with the Mohr balance. A. KLAUS. *Chem.-Ztg.* **47,** 85–6(1923).—A critical discussion of the errors involved and means for correction. Capillary effects introduce an error which may amount to several units in the 4th decimal place. With all corrections applied, ds. may be obtained to the 5th decimal place, but knowledge of the capillary consts. is necessary. Tables are given for the correction of the capillary effect. This correction may be reduced by decreasing the diam. of the suspension wire or increasing the vol. of the sinker, but an accurate balance for all purposes, without any corrections necessary, seems to be an impossibility. H. C. PARKER

The structure of silicon. H. KÜSTNER AND H. REMY. *Physik. Z.* **24,** 25–9 (1923).—Samples of various Si prepns., the so-called graphitic, brown, gray-blue, gray-brown and amorphous forms, were subjected to intensive study as to contamination with SiO_2, chem. reactivity, particle sizes microscopically and from the speed of fall in alc., and the crystal structure by X-ray analysis. All samples containing from 2.7 to 30% SiO_2 showed the diamond type structure originally assigned by Debye and Scherrer. So-called "amorphous" Si with a content of 72% SiO_2 gave the spectrum of natural quartz. Silicic acid gave no spectral lines, but amorphous Si does not exist since all Si samples gave sharp lines. The edge length of the elementary cube of Si is 5.4204 ± 0.00016 Å. G. L. CLARK

The crystal form of some organic arsenic compounds. G. GILTA. *Bull. soc. chim. Belg.* **32,** 19–26(1923).—*p*-Arsanilic acid crystals are of the monoclinic system—$a:b:c$ = 1.393499:1:1.162276, β = 101°20′. The crystals exhibit a very different development according to the conditions of crystn.; various forms are described. The Na salt of this acid also forms monoclinic crystals, $a:b:c$ = 2.181215:1:0.960163, β = 91°4′. R. BEUTNER

Micro-crystallization. A. ERDENBRECHER. *Mikrokosmos* **16,** 105–10(1923).—Review of methods of producing crystals and discussion of the value of the polarizing microscope in studying crystal structure, transformations and equilibria between hydrates, etc. G. L. CLARK

Molecular fields and their volumes. A. I. BACHINSKII. *Bull. acad. sci. Russie* **1,** 11–23 (1918).—Mol. properties which may be considered as functions of the mol. vols. can be additively calcd. with a satisfactory degree of precision from the at. vols. of elements entering into the mols. From the viewpoint of the old theory, representing the atoms as solid bodies, the existence of this relation was quite justified, whereas the new ideas considering the atom as a field of electromagnetic forces, whose whole vol. contains only electrons and a nucleus with small positive charge, can hardly account for the possibility of the at. vols. remaining almost undistorted when the atoms form a composite mol. To explain the well known facts, it must be assumed that there is a certain constancy of vols. occupied not only by the intra-at. forces, but also by such of them which protrude from the at. field, when a combination between atoms ensues, and form the inter-at. bonds. Upon the conception of bonds occupying vol. the following equation is derived for the summation property, A, of the mol. C_mH_n: $A = 2my + n[x - (y/2)] + p(z - 2y) + q(v - 3y)$, where y is the vol. increment of ordinary bonds

between atoms of C, x that of a plain bond between C and H, p the no. of double bonds each with increment z, and q the no. of triple bonds each with increment v. For normal paraffins at the b. p. $x = 7.26$ and $y = 7.77$, or $x = y = z/2 = v/3$ approx. Various calcns. are made from these relationships. M. S. KORSUNSKY

Composition, purification and certain constants of ammonia. E. C. MCKELVY AND C. S. TAYLOR. *Refrigerating Eng.* **9**, 213–25; Bur. Standards, *Sci. Papers* No. **465**, 655–93(1923).—An analytical examn. was conducted upon 8 standard Am. and 3 Ger. brands of com. NH_3. Most com. ammonias contain less than 0.1% of impurities, among which are non-condensing gases (air mixt.), volatile C compds., pyridine and water. A descriptive review of app. and methods is given, together with several improved forms of app. for distn. at pressures greater and less than atm. NH_3 was prepd. in 5 diff. ways, yielding products contg. no org. impurities, less than 1 to 1,000,000 by vol. of non-condensing gases, and less than 0.003% by wt. of water. A careful examn. of the phys. properties of the pure NH_3 showed: d. of solid NH_3 0.817 at −79° and 0.836 at −185°; f. p. −77.70° with a vapor pressure at this temp. of 42.2 mm. Hg; a mean coeff. of linear expansion of 7×10^{-5} per degree C. H. F. ZOLLER

Specific volume of saturated ammonia vapor. C. S. CRAGOE, E. C. MCKELVY AND G. F. O'CONNOR. *Refrigerating Eng.* **9**, 239–58; Bur. Standards, *Sci. Papers* No. **467**, 707–35(1923).—The sp. vol. of satd. NH_3 vapor was measured in the temp. interval −50° to +50° by 2 methods, one involving a direct detn. of the mass of the vapor contd. in a known vol. and the other, an optical method, involving measurements of the n of the vapor. The values for the sp. vol. were calcd. by the Clapeyron equation from other data obtained at the Bur. of Standards. The exptl. results by the 2 methods agree with the calcd. values above 0°, differing at most by 0.3%; below 0° the results by the direct method are systematically lower than those by the optical method, differing from the Clapeyron values by about 2% at −50°. The calcd. values were chosen as the most probable values. Possible sources of error are discussed. The values obtained by Ledoux, Peabody, Wood, Zeuner, Mollier, Dieterici, Wobsa, Hütte-Macintyre, Hybl, Lucke, Goodenough, Holst, Keys and Bur. of Standards are compared. H. F. ZOLLER

The effect of long grinding on quartz (silver sand). R. C. RAY. *Proc. Roy. Soc.* (London) **102A**, 640–2(1923).—From the difference of the heats of soln. of quartz before and after grinding, it was indicated that 31.2% had been vitrified (*C. A.* **16**, 4120). The *densities*, as detd. with redistd. CCl_4, are as follows: d_{17} of silver sand (unground) 2.638; of silver sand (ground for 15 hr.) 2.528; of silica glass (crushed) 2.208. These differences indicate that 25.7% has been vitrified—a good check, considering the strain under which the ground material exists. H. C. PARKER

Activation of hydrogen by diffusing it through palladium and platinum. Y. VENKATARAMAIAH AND M. V. N. SWAMY. *Proc. Sci. Assoc. Maharajah's College, Vizianagram* Dec. **1922**, 23–7.—A study of the mechanism of the contact reaction of H and Pd and Pt (cf. *C. A.* **16**, 3245) with a new method for activating H. Purified H was diffused through a closed Pd tube at varying temps. up to 800°. The activity was detd. by passing the diffused gas over cold S and $Pb(OAc)_2$. Blackening occurred in 12–14 hrs. with diffusion at 400–500° and in 16–18 hrs. at 200–300°. Using a Pt tube, diffusion at 700–800° required 16–17 hrs. to produce active H. Ionization is probable (cf. *C. A.* **14**, 1779) since the gas discharges a Au-leaf electroscope. Passage of the active gas through glass wool precluded the possibility of at. H since at. H cannot survive contact with glass wool. That S is reduced to H_2S at ordinary temps. cannot be explained by the energy hypothesis of Anderson (cf. *C. A.* **16**, 3245), since the gas gains its equil. energy content when cooled below the temps. at which he observed reduction, and since it loses the extra no. of quanta added by contact with Pd or Pt. H_3 mols. are probably present in the gas desorbed from Pd and Pt. C. C. DAVIS

Restricted movements of molecules at very low pressures. H. H. PLATT. *Phil. Mag.* **45**, 414–5(1923).—P. proposes to modify the app. of Fairbourne (*C. A.* **16**, 2799) by substituting a plate provided with a large no. of holes instead of one, shaped like truncated cones so that at very low pressure the gas mols. with free paths greater than the dimensions of the holes will strike the sides. This produces an unbalanced pressure and if the plate is mounted on a pivot, revolution is produced by having the holes on the two halves of the plate oppositely directed so that the force is always applied in the same direction. S. C. L.

Apparent deviation from Henry's law for the system: ammonia-water. G. CALINGAERT AND F. E. HUGGINS, JR. *J. Am. Chem. Soc.* **45**, 915–20(1923).—The ratio of vapor to liquid compn. has been detd. at the b. p. for 8 concns. between 0.005 and 1.25 g. NH_3 per l. A deviation from Henry's law has been observed, which might be

due to elec. dissocn. of NH_3. A max. b. p. for the system corresponding to 0.000010 g. NH_3 per l. must exist, and the distn. curve must be similar to that of aq. solns. of HCl and HBr. H. JERMAIN CREIGHTON

Vapor pressures of carbazole, observed and calculated. C. E. SENSEMAN AND O. A. NELSON. *Ind. Eng. Chem.* **15**, 382–3(1923).—Data detd. by a method already published (cf. *C. A.* **16**, 1175) are given for the vapor pressures of carbazole between 250° and 355°. The carbazole analyzed 8.22% N with b. p. 354.76° (351.2° given in the literature). Calcd. by the Clapeyron equation of state, similar vapor pressure values were obtained. Calcn. of the entropy of vaporization at 260° with a concn. of 0.00507 mols. per l. gave 14.9 (13.7 by Hildebrand for 15 liquids), from which it is inferred that carbazole may not be a normal liquid. C. C. DAVIS

Nature of the liquid state. C. V. RAMAN. *Nature* **111**, 428(1923).—Commenting on W. H. Bragg's proof (*C. A.* **17**, 1172) that complexes formed by union of 2, 3, or 4 mols. of org. compds. exist as such in crystal lattices, R. asks "whether, when a crystal is melted these complexes retain their integrity or break up further into individual molecules?" From application of the Lorentz-Mosotti formula to data arising from studies of mol. scattering of light it appears that the ultimate unit in solid and liquid state differ. However, from liquid crystals and other considerations R. concludes that the ultimate unit is the same in both solid and liquid states. W. H. BRAGG. *Ibid* 428.—Reply to Raman's letter. The ultimate unit in liquid and solid state is not necessarily the same. Whenever association occurs in the liquid state it "tends to do so in the ordered fashion of the appropriate crystal." JACOB CORNOG

The properties of a liquid in the state of saturation in the neighborhood of its critical point. G. BRUHAT. *J. phys. radium* **4**, 46–8(1923).—Paragraphs 4 and 5 of an article by M. Ariès (*C. A.* **17**, 1176) were included by an editorial error. B. explains the nature of the mathematical error occurring in these paragraphs, which leads to simpler expressions for the quantities d^2p/dT^2 and $m + m'$ than obtained previously by B. (*C. A.* **16**, 867). The problems involved may only be solved by B.'s method of development into a series. H. C. PARKER

Relation between the viscosity of a liquid and its coefficient of expansion. D. B. MACLEOD. *Trans. Faraday Society* (advance proof) **1923**.—In general, substances with small coeffs. of expansion have higher viscosity than those with large coeffs. Examples are given from the higher members of homologous series of C compds. Fatty acids and alcs. do not follow this rule because of mol. association. Viscosity is chiefly dependent on 2 factors, a factor depending on the mol. itself and independent of temp. in the case of normal unassociated liquids, and a factor depending on the free space within the liquid. It is shown that $\eta_t X_t A$ = const., where η_t = viscosity of liquid at $t°$, and X_t = vol. of free space associated with a definite vol. of mols. at the same temp. For normal liquids A is very nearly unity. For associated liquids it is higher. The values obtained for the free spaces of various liquids at their various b. ps. are practically const., and of the order required by van der Waal's theory. Examples are given for a variety of simple aliphatic compds. X at 0° in general decreases in an homologous series with rise in mol. wt. An expression $(\eta_p - \eta_1)(V - V_b) = C$ is given for CO_2 where η_p = viscosity at p atms., η_1 = viscosity at 1 atm., V is the reciprocal of the d., and V_b = vol. occupied by the mols. Examples are given at pressures ranging from 1 to 110.5 atm. ROGER G. FRANKLIN

Surface tension of mercury in contact with oxygen. J. PALACIOS AND E. LASALA. *Anales soc. españ. fis. quím.* **20**, 505–8(1922).—It is well known that a freshly formed mercury surface in contact with air or oxygen changes in shape because of a gradual change in surface tension. However, if the air or O be rendered absolutely free from moisture or traces of O_3 no change in surface tension takes place. Cf. *C. A.* **16**, 181. L. E. GILSON

The surface tension of solutions as a function of concentration. Y. L. SHEKHTMAN. *Bull. acad. sci. Russie* **1919**, Series VI, 657–62.—According to Quincke the surface tension of solns. is a linear function of concn. Other investigators found that this law is not true for very small and very large concns., probably because of electrolytic dissociation and polymerization, resp. In order to follow up the change in surface tension for a nonelectrolyte soln. at small concns. S. used solns. of naphthalene in benzene, and studied them by the method of Röntgen (level differences in capillaries). Up to 1 g. mol. concn. a linear equation $\alpha = \alpha_0 + 1.1079\ m$ represents the coeff. of surface tension without any deviations at low concns. At normal temps. the variation of the surface tension per 1° amounts to 0.0045 of the value at 20°. M. G. KORSUNSKY

The antagonistic action between salts on the surface tension of organic colloidal solutions. TETSUTARO TADOKORO. *J. Biochem.* (Japan) **2**, 361–5(1923).—Surface

tension is a characteristic property of colloidal solns. and is governed by changes in degree of dispersion. With aggregation producing a min. electrostatic charge the surface tension of a colloidal soln. would increase; the opposite would occur with solvation. The colloidal solns. employed were horse serum and fresh vegetable juice, and the surface tension was measured with the Nouy's app. at const. temp. The salts tested were: $CaCl_2$, NaCl, $MgCl_2$, $Ca(NO_3)_2$, $ZnSO_4$, KCl, KNO_3, $AlCl_3$. The antagonistic action between 2 salts is caused by a reversal of the surface tension with these colloidal solns., which in turn is associated with a reversal of the state of aggregation.
S. MORGULIS

Supplement to, "Determination of solution densities. Determination of the difference in density between air-free water and water saturated with air." O. E. FRIVOLD. *Physik. Z.* **24**, 86–7(1923); cf. *C. A.* **15**, 201.—It is shown how systematic error may be eliminated from the results obtained by this method of detg. d. R. H. LOMBARD

Determination of the distribution of size of particles in disperse systems. T. SVEDBERG AND H. RINDE. *J. Am. Chem. Soc.* **45**, 943–54(1923).—An improved form of Oden's method for the detn. of the distribution of the size of particles in a disperse system is described. The procedure is illustrated by sedimentation and distribution curves of Hg and Au hydrosols. A method is also described for detg. the distribution of size of particles, depending on the variation of concn. with height in a sedimenting system. This method was investigated with a Au hydrosol, the concn. at different heights being measured by means of light absorption. H. JERMAIN CREIGHTON

The law of distribution of particles in colloidal suspensions with special reference to Perrin's investigations. II. A. W. PORTER AND J. J. HEDGES. *Trans. Faraday Soc.* (advance proof) 1923; cf. *C. A.* **16**, 4104.—Emulsions of paraffin in H_2O were examd. in regard to distribution of the particles with height. There was an increase of concn. with height reckoned from the bottom. The exptl. results agreed well with those calcd. by the use of the equation previously developed. H. M. MCLAUGHLIN

Periodic opacity of certain colloids in progressively increasing concentrations of electrolytes. J. HOLKER. *Proc. Roy. Soc.* (London) **102A**, 710–34(1923).—Opacity measurements were made by a previously devised method (*C. A.* **16**, 290). Human serum heated to 56° was mixed with aq. NaCl in various proportions, kept in a thermostat at 40° and the opacities were detd. after 4 hours. Opacity of serum in the presence of increasing concns. of NaCl varies in a periodic manner. With low concns. of NaCl (0 to 0.96%) the opacity of the serum decreases to a minimum while above 0.96% NaCl it increases steadily to a max. at 2.24%, etc. Both maxima and minima increase in height with increasing concns. of NaCl. Varying the wave length of the incident light in the measurement of opacity shows that the periodicity is not due to an optical interference of the light scattered by particles uniformily changing in size, but is rather due to an oscillatory change in the phys. conditions of the particles themselves. Varying the concn. of the serum shows that the periodic character persists to a dilu. of 40 times and that both amplitude of oscillations and their no. increase with the concn. of the serum. Varying the temp. shows that the amplitude increases more and more rapidly from 0° to 17.5° whereas from that to 56° the amplitude increases more and more slowly and above 56° the amplitude becomes irregular owing to changes in the serum. The opacity of serum dild. with various electrolytes as well as the opacity of various colloids is specific for each. The theory of periodic opacity phenomena is developed on the basis of periodic variation in the properties of colloid particles with increase in positive and negative ions. I. NEWTON KUGELMASS

Preparation of colloidal gold solutions with the aid of electrical discharges. W. NAUMOFF. *Kolloid-Z.* **32**, 95–100(1923).—The sparks from a Rumkorff coil (Pt electrodes) on or near the surface of a soln. of $HAuCl_4$ (6:1000) produce variously colored colloidal solns. The reducing agents are the gases or substances produced during the discharges. Sparking between a pair of electrodes in the inner compartment of a partitioned vessel on the surface of the soln. first produces copious formation of colored colloid and only later on causes reduction of the soln. in the outer compartment. Reversing the polarity of the sparks reveals that a red colloid is formed at the negative pole and a violet or blue colloid is formed at the positive pole. In a divided vessel with a constricted contact and submerged electrodes the first sign of red coloration appears in the positive compartment; much later a blue coloration appears in the negative chamber. Only reducing gases produce colloid. A. MUTSCHELLER

Smokes. I. A study of their behavior and a method of determining the number of particles they contain. R. WHYTLAW-GRAY, J. B. SPEAKMAN AND J. H. P. CAMPBELL. *Proc. Roy. Soc.* (London) **102A**, 600–15(1923).—Three methods of producing the smokes (aerosols) were used: (1) Volatilization in a rapid current of air; (2) chem.

reaction in the air; (3) arc or spark discharge in a current of air. Concns. up to 20 mg. per cu. m. have been examd. of particles 3–10 × 10^{-6} cm. radius. The systems were stable 24 hrs. The number of particles per cc. was detd. by an adaptation of Zsigmondy's method of counting the particles with a slit ultramicroscope. Curves showing the number per cc. as a function of the time, exhibit a rapid decrease in the no. (due to agglomeration) during the first 30–200 mins. and later a stable state. With aerosols of CdO and ZnO the aggregates are in the shape of chains oppositely charged at the ends, showing the polar nature of the particles. Mg, Al and Sb oxides show the tendency to form similar aggregates, while those of Pb, Cu, Mn and Cr do not, indicating that the nature of the aggregation depends upon the chem. nature of the particles. The structure of the pptd. aerosol (aerogel) is composed of a network of these chains, probably similar to the structure of many gels. H. C. PARKER

Lyotrope action in colloidal solution processes. N. P. PESKOV. *Kolloid-Z.* **32,** 163–6(1923); cf. *C. A.* **17,** 1570.—The velocity of colloid soln. processes has been found to be subject to the lyotrope influence of the cations of neutral alkali salts present in the medium. The phenomenon differs from the gelatin influence previously reported in that it is observed alike in many phenomena of mol. solns. as well as in these colloid processes; hence it depends upon a change in the properties of the solvent or dispersion medium rather than on the presence of an interface between phases. Processes studied include soln. of As_2S hydrosols of varying dispersity by NaOH or Na_2CO_3 and soln. of Au (protected by gelatin) and of CuS sols by KCN. The order of effectiveness of the ions in accelerating the velocity of soln. was always $NH_4 < (H_2O) < Li < Na < K < Rb < Cs$. The differences observed in a typical case ranged from 24 min. in the presence of $N/24$ NH_4 to 35 sec. with $N/24$ Cs. The same order is observed regardless of the dispersity of the sol, even when the sol is first coagulated by freezing before addn. of the reagents. F. L. BROWNE

Cataphoresis of proteins. T. SVEDBERG AND E. R. JETTE. *J. Am. Chem. Soc.* **45,** 954–7(1923).—A method is described by means of which the rate of migration of a protein particle under the influence of an elec. field can be detd. exptly. In this method the protein is caused to fluoresce by means of ultra-violet light. By photographing this fluorescence the positions of the boundaries of the protein are measured. H. JERMAIN CREIGHTON

The difference between the adsorptive powers of charcoal from common and glutinous starches. TETSUTARO TADOKORO AND YUKIHIKO NAKAMURA. *J. Biochem.* (Japan) **2,** 239–50(1923).—The starches were prepd. from white rice, millet and from Italian millet freed from protein admixt. by digesting several times with 0.3% NaOH. The material washed free of the alkali was allowed to sediment and the pure starch which formed the middle layer was carefully sepd., washed with alc. and ether and dried at 50°. The material was neutral, and in prepns. from various sources it contained 6.7–12.7% moisture, and 0.07–0.28% ash. The charcoal was made from these starches by heating in hard-glass tubes for 2 hrs. at 460°, then ground when cool to a fine powder (0.5 mm. sieve). 0.2 g. samples were shaken with 40 cc. of KI solns. of varying normality (0.1–0.005 N) for 30 min. and centrifuged. 2 cc. of the clear liquid were then titrated with $Na_2S_2O_3$. The exponent of the Freundlich adsorption formula $^1/_n$ was calcd. from these results and served to est. the relative adsorptive powers of the different starch prepns. The adsorptive capacity of both the charcoal and gel of glutinous starch was always superior to that of common starch. It also required a larger quantity of tannin for coagulation. S. MORGULIS

Adsorption of gases by oxide catalysts. A. F. BENTON. *J. Am. Chem. Soc.* **45,** 887–900(1923).—The adsorption of CO_2, O, H and CO by CuO, MnO_2, Cr_2O_3, Fe_2O_3, V_2O_5, SiO_2 and Hopcalite has been measured at a pressure of 1 atm. between −79° and 0° for H and CO, and between −79° and 184° for CO_2 and O, the measurements being corrected for absorption and for the progressive chem. reaction with H and CO. Two types of adsorption, designated as "primary" and "secondary" to indicate the kind of valence forces involved, are discussed. The former type is sp. and results in the formation of more or less stable surface complexes; the latter is not sp. In the cases of adsorption investigated these types, which occur simultaneously, are differentiated and the extent to which each occurs estimated. The secondary adsorption of different gases is in the order of their m. ps., which is also true of that by different adsorbents. The primary adsorption of CO is approx. in the order of the relative reducibility of the different oxides. H. JERMAIN CREIGHTON

Adsorption and catalysis in carbon monoxide oxidation. A. F. BENTON. *J. Am. Chem. Soc.* **45,** 900–7(1923); cf. preceding abstract.—The significance of the adsorption measurements (in the preceding paper) in the catalytic oxidation of CO is discussed.

While neither the secondary nor the total adsorptions by different oxide catalysts bear any relation to their relative catalytic activities, the primary adsorption of CO is in exactly the same order as the catalytic activity of the oxides. The mechanism of reduction of an oxide by a gas is discussed as a 3-stage process involving (1) adsorption, (2) isomeric change, (3) evaporation of product from surface. Several possible ways are discussed in which catalytic oxidation of CO in contact with metallic oxides might occur. H. JERMAIN CREIGHTON

Adsorption of silver salts on silver and gold surfaces. E. G. RUDBERG AND H. v. EULER. *Z. Physik* **13**, 275–83(1923); cf. *C. A.* **15**, 1437; **16**, 1351.—Au leaf 0.2 mm. thick and Ag leaf 0.15 mm. thick were immersed in dil. $AgNO_3$ solns. The adsorption curve with Au at first rises rapidly up to concn. of 0.015 *N* $AgNO_3$; with higher concns. adsorption value of 5.3 mg. Ag per sq. m. of surface is approached assymptotically. In the case of Ag foil max. value is 8.5–9 mg. Ag per sq. m. of surface. R. and E. believe higher value for Ag due to reaction between at. Ag on surface and Ag ions to form complex Ag_3^+. Anions are likewise taken up in equiv. proportions. The quantity adsorbed is independent of the vol. of soln. Temp. differences of from 0° to 50° and condition of surface of adsorbent are without effect. Alkali or H_2SO_4 are not adsorbed. The adsorption of Ag ions is thought to be due to a Nernst-Helmholtz double layer. BENJAMIN S. NEUHAUSEN

The nature of soap solutions (sodium palmitate and sodium oleate). W. LEETEN. *Z. deut. Öl-Fett-Ind.* **43**, 50–2, 65–6, 81–2(1923).—Freshly prepd. Na palmitate solns. were filtered through a membrane filter which passed 100 cc. of pure H_2O in 5 sec. against vacuum; the Na oleate soln. passed through the filter without leaving a residue. Later an ultrafilter by Zsigmondy and a high-pressure ultrafilter by Kroeger-Ihlenfeld, which passed 100 cc. pure H_2O through 80 $cm.^2$ in 11 hrs., were employed. This retained Na oleate so that even a 0.001 *N* Na oleate could be concd. to a jelly, only a little Na oleate showing in the filtrate. Cond. and migration measurements of Na oleate solns. are described. *Conclusions.*—(1) The filtrates from jellied Na palmitate solns. of varying concn. contain nearly the same amt. of Na palmitate, equiv. to a soly. of 0.00024 moles Na palmitate per l. at 18°. (2) The calcd. degree of hydrolysis is smaller than that found by Krafft. (3) The sepns. from Na palmitate solns. are cryst. and show double refraction which does not disappear near 100°; therefore no H_2O of crystn. appears to be present and the free fatty acid from hydrolysis is only physically mixed. (4) No "acid soap" exists and the sepd. threads or leaflets of soap must be considered as an absorption by the soap of free fatty acids. (5) The mobility of dissolved soap is normal in a U-tube and corresponds to Bredig's limit of migration speed for high mol. org. compds., *viz.*, 18. (6) The λ_v cond. curve of Na oleate at 25° shows a distinct min. similar to the min. found by McBain for Na palmitate. (7) The OH^- ion concn. of Na oleate solns., as detd. by potential measurements, is small. (8) Na oleate solns. behave electrically to a certain degree like ordinary electrolytes. (9) The hydrolysis const. has a strikingly small value. (10) Cond. measurements show that a considerable portion of non-dissociated Na oleate is contained in the micellae. (11) Migration expts. show that there is present besides Na ions a considerable amt. of Na which migrates toward the anode, evidently as a constituent of the negatively charged micellae. (12) McBain's theory of soap micellae is confirmed. (13) Na oleate solns. may be highly concd. (× 6) by ultra-filtration. P. ESCHER

Solubility of zinc in hydrochloric acid at high pressures. V. N. IPATIEV AND V. VERKHOVSKII. *Bull. acad. sci. Russie* **1918**, 1–10.—A hypothesis was formerly expressed (*J. Russian Chem. Soc.* **41**, 722(1909)) that at very high H pressures and strong concns. of HCl, the dissoln. of Zn might cease totally on account of reaching equil. The present work deals with expts. showing that no pressure can stop the dissoln. although the velocity of the latter is strongly affected in the negative direction. Zn and acid were introduced under different initial pressures, and allowed to react for a certain no. of days with a continuous recording of pressures. The latter were primarily due to the amt. of dissolved Zn but were greatly influenced by the size of the initial free space, the contraction of the whole system $HCl + H_2O + Zn$, when changed to $HCl + ZnCl_2 + H_2O$, the compression of the liquid and the dissoln. of H. At final pressures not exceeding 550 atm. the secondary influences were large enough to make the pressure practically const., seemingly indicating a state of equil., but a series of expts. accomplished under a condition of no free initial space showed, however, that the pressure increases up to the last particle of Zn, though its final figure is also greatly reduced by the 3 above mentioned influences. M. G. KORSUNSKY

The solubility of phosphoric anhydride in methyl and ethyl alcohols. M. A. RAKUZIN AND A. A. ARSENIEV. *Chem.-Ztg.* **47**, 178(1923).—The question of the state

of soly. as a transition step towards a chem. reaction is considered. For the *prepn. of the esters of phosphoric acid*, 4 times the amt. of MeOH and 8 times the amt. of EtOH are needed to bring a given amt. of P_2O_5 into soln. as are needed to react with it. The resulting soln. is stable towards cold H_2O, has an acid reaction, and gives no ppt. with $AgNO_3$. Work along the same line was done with *phenol*, and *menthol*. P_2O_5 in the presence of $CHCl_3$ brings the phenol into soln. No reaction takes place, however, as on evapg. the $CHCl_3$, the P_2O_5 and later the phenol sep. out. ROGER G. FRANKLIN

Precision procedure for the determination of the diffusion coefficient in any solvent. E. COHEN AND H. R. BRUINS. *Z. physik. Chem.* **103,** 349–403(1923).—Previous methods for the detn. of diffusion coeffs. are critically discussed. A precision method has been worked out which possesses the following advantages: (*a*) It may be employed for both aq. and non-aq. solns.; and it requires but a small quantity of liquid. (*b*) The method can be used for measurements at any temp. over a large range. (*c*) It gives the "true" diffusion coeff., since during the measurement the change in concn. is very small. With diffusion into the pure solvent D_∞ is in many cases directly measured. (*d*) Disturbances at the beginning of the expt. on bringing the soln. and solvent together are practically nil, and this is probably also true on separating the diffusion layers. (*e*) Vibrations during the process of diffusion are entirely eliminated, and disturbances due to temp. fluctuations during the measurement are reduced to zero. (*f*) The true coeff. of diffusion is measured to within a minute, and the height of the diffusion layers to within 0.01 mm. With aq. solns. the results obtained by the method are reproduceable to within a few tenths of a percent. By this method diffusion coeff. of KCl (in H_2O) at 20.00° is 1.455 cm.²/24 hrs. H. JERMAIN CREIGHTON

Validity of the Stokes-Einstein law for diffusing molecules. E. COHEN AND H. R. BRUINS. *Z. physik. Chem.* **103,** 404–50(1923); cf. preceding abstract.—The validity of the Stokes-Einstein equation for diffusion in mol. solns. at different temps. has been investigated by measuring the velocity of diffusion of $C_2H_2Br_4$ and $C_2H_2Cl_4$ at a no. of temps. between 0° and 50°. A deviation from the law has been observed, which is 3 times as great as can be accounted for by exptl. error. The temp. coeff. of the velocity of diffusion is less than that required by the equation. The viscosity of $C_2H_2Cl_4$ has been detd. over the temp. interval 0–50° with an accuracy of 0.05%.
H. JERMAIN CREIGHTON

The basic strength of ammonia and allied bases. R. M. CAVEN. *Chemistry and Industry* **42,** 164–6(1923).—Lowry's definition of a base as an acceptor of H nuclei suggests the theory that undissociated NH_4OH in soln. may not exist at all, and that the basicity of very dil. aq. solns. of NH_3 may be due to the presence of the NH_4 ion formed by the reaction: $NH_3 + HOH \rightleftarrows NH_4^+ + OH^-$. PH_3 is not sufficiently basic to appropriate the hydrions of H_2O, and therefore does not form an alk. soln.
T. S. CARSWELL

Saponification velocity of formaldehyde-methyl acetate. A. SKRABAL AND M. BELAVIC. *Z. physik. Chem.* **103,** 451–60(1923).—The mixed acetal, formaldehyde-AcOMe, has been saponified in the presence of both acid and alkali at 25°. In the presence of acid the mixed acetal saponifies more rapidly than the 2 pure acetals (methylal and methylene-diacetate), while in the presence of alkali the velocity of sapon. lies midway between the velocities of the pure acetals. From the exptl. data the "group-velocities" in the mixed acetal are deduced, and this consideration is extended to ordinary esters. H. JERMAIN CREIGHTON

Piezochemical studies. XVII. Influence of pressure on reaction velocities in homogeneous liquid systems. A. L. TH. MOESVELD. *Z. physik. Chem.* **103,** 486–504 (1923).—The pressure coeff. of the velocity of the reaction, $5HBr + HBrO_3 = 3Br_2 + 3H_2O$, has been detd. at several temps. between 1° and 39°. The coeff. is independent of the temp. over the interval studied. The reaction velocity at 1500 atm. pressure is about 15.4% less than at 1 atm. In contrast to the influence of pressure on sapon., the effect of pressure in the reaction studied is not only negative but also much smaller. Accordingly, it is concluded that pressure exerts a sp. effect on reaction velocity.
H. JERMAIN CREIGHTON

Calculation of velocity constants. A. L. TH. MOESVELD. *Z. physik. Chem.* **103,** 481–5(1923).—See *C. A.* **16,** 3790. H. JERMAIN CREIGHTON

Chemical catalysis. GAETANO CASTELLI. *Rass. min. met. chim.* **58,** 10–3(1923).—A general description of inorg. and org. catalysts and the theories advanced to explain their action. C. C. DAVIS

Influence of temperature, pressure and supporting material for the catalyst on the adsorption of gases by nickel. A. WM. GAUGER AND H. S. TAYLOR. *J. Am. Chem. Soc.* **45,** 920–8(1923).—Isotherms of the adsorption of H on Ni using N as a reference gas

show that there exists a definite satn. capacity of Ni for H which depends on the temp. A value of approx. 2500 cal. per g. mol. has been deduced from the variation of the satn. pressure with temp. for the heat of adsorption of H on Ni, whereas by a different method Rideal (cf. *C. A.* **16**, 1389) obtained a value of 12000 cal. The use of an inert material for catalyst support increases greatly the absorptive capacity per g. of Ni and yields a catalyst capable of standing more severe heat treatment. H. JERMAIN CREIGHTON

A study of the factors influencing compound formation and solubility in fused salt mixtures. JAMES KENDALL, E. D. CRITTENDEN AND H. K. MILLER. *J. Am. Chem. Soc.* **45**, 963–96(1923).—The authors have investigated the f.-p. curves of more than 50 binary fused-salt mixts. and have established the existence of 49 new compds. The reference salts used were *$AlBr_3$, $AlCl_3$ and $SbCl_3$*. Of the 57 compds. indicated only 2 contain an excess of the second component. In 12 systems compds. of undetd. compn. sepd. from 2 partially miscible liquid layers. *$2AlBr_3.HgBr_2$* was found to exist in 2 distinct cryst. modifications m. 103.9° and 102.8°. There are 2 allotropic forms of *$AlBr_3$* with a transition point at 70.2°. *$SbCl_3$* exists in 3 cryst. forms with transition points at 69.5° and 65.0°. The existence of 2 forms of *CBr_4* with a transition point at 48.4° has been confirmed. The factors influencing compd. formation and soly. in the 3 series are discussed. Of these the diversity of the constituent radicals of the component substances is the main influence. Valence, unsatn., position in the electrode potential series, temp., internal pressure, at. vol., at. no., and association are other factors discussed in this connection. L. T. FAIRHALL

Study of curves of melting points of binary mixtures of α-nitronaphthalene with one of the dihydroxybenzenes as well as of the three dihydroxybenzenes with each other. PIERRE SENDEN. *Bull. soc. chim. Belg.* **32**, 97–102(1923).—The m.-p. curves of binary mixts. of these substances indicate the absence of any mol. compds. The following m. ps. are observed: α-nitronaphthalene 55.8°, resorcinol 109.5°, hydroquinone 170.5°, pyrocatechol 103.5°. The eutectic points of the binary mixts. of a dihydroxybenzene and α-nitronaphthalene are: with resorcinol (10.1%) 49.5°, with hydroquinone (0.99%) 54.3°, with pyrocatechol (16.93%) 44.8°. R. BEUTNER

The system copper-oxygen. E. MOLES AND M. PAYÁ. *Anales soc. espan. fis. quim.* **20**, 563–70(1922).—The absorption of O_2 by Cu begins at about 350°; at this temp. also the dissociation of CuO begins. CuO wire, commonly used in analysis, is a solid soln. of Cu_2O in CuO and may contain as much as 86% of Cu instead of the theoretical 80%. Powdered CuO shrinks and consolidates when heated and its dissociation pressure is decreased but it is restored to its original value if repowdered. This product presents an anomaly in its compn.; it contains only 76% Cu and this value is not changed even by heating *in vacuo* to 1060°. L. E. GILSON

The equilibrium in the reduction of stannic oxide by carbon monoxide. W. FRAENKEL AND K. SNIPISCHSKI. *Z. anorg. allgem. Chem.* **125**, 235–51(1923).—The equil. of the reaction: $SnO_2 + 2CO \rightleftarrows Sn + 2CO_2$ was examd. from both sides, between 600° and 1200°. The equil. was found to be independent of the weight and compn. of the solid components. The equil. constant: $C_{co}/C_{co_2} = K$ decreased from 0.28 to 0.05 between these temps., agreeing with the sign of the heat of the reaction (—1460 cals.). The equil. concn. of the CO_2 rises nearly as a linear function of the temp. up to 900° where a sudden unexplained increase takes place. Expts. were made upon the velocity of the reaction at different temps. An improved method for the *prepn. of SnO* is described. H. C. PARKER

Dissociation of gases. A. SCHELEST. Berlin: *Buch und Lehrmittelgesellschaft* 63 pp.—S. discusses the dissociation of gases as affecting the process of combustion. The final products of combustion, H_2O and CO_2, dissociate, the extent depending on conditions. If they are removed from the system while still dissociated, the combustion process is not as complete as if they were undissociated, and as a result there is a loss in the amt. of heat liberated in the reaction. Using the exptl. data of Langen, S. calcs. the loss of heat due to dissociation in a system of H burned with varying amts. of air, and air enriched with O. He also calcs. the temp. at which combustion would take place if there were no dissociation. The sp. heat of the mixt. after combustion, the heat which would be liberated without dissociation, the loss of heat and the actual temp. of the reaction are plotted against increasing values of the proportion by vol. of inert gases. These curves show that dissociation is not noticeable below 2000°, but is quite marked above that temp. Similar calcns. are made for a system consisting of equal parts of *H_2* and *CO*, mixed with increasing amts. of atm. air, or air enriched with O, and also for the combustion of heavy naphtha. These theoretical considerations are then applied to natural phenomena, such as the burning of a candle, and the spontaneous combustion of coal, straw and grain with conclusions as follows: Combustion

is always accompanied by dissociation of the products of combustion. The nature and color of a flame depend upon the dissociation. As the excess of air decreases, the temp. of combustion increases, as does also the degree of dissociation. The higher the initial temp. of the system before combustion, the greater will be the temp. of combustion, and the dissociation. The latter is greater in an internal-combustion engine than in a steam engine. By considering the change in sp. heat of the products of combustion due to dissociation, the influence of the rate factor on the course of the combustion can be accounted for. This change in the sp. heat is called the chem. sp. heat, and varies with the temp. For processes in which no chemical reaction takes place the sp. heats of gases are independent of the temp. but vary with pressure. These conclusions applied to the theory of the steam and internal-combustion engine give results within 2 to 3% of those obtained in actual practice ROGER G. FRANKLIN

Specific heats of polyatomic gases at low temperatures. R. W. MILLAR. *J. Am. Chem. Soc.* **45**, 874–81(1923).—"It was hoped to det. whether the first increase in heat capacity above $\frac{3}{2}R$ is due to rotational energy, as has usually been assumed, or to vibrational energy." It was concluded that: "the heat capacities of gases do not depend on the number of atoms in the mol. alone, but upon the masses of the atoms, the constraints, and the temp." CH_4, CH_3Cl, BF_3 and H_2S were investigated from temps. near their b. ps. to 5°. The gases were run through a copper aneroid calorimeter of about 14 cc. vol., inclosed in a jacket formed by a copper cylinder weighing about 3 kg. This jacket was in an inclosure which could be exhausted to a vacuum of better than 10^{-5} mm. In this situation it could be readily controlled by the aid of a heating coil. Results generally agreed nearly or quite to 1%. W. P. WHITE

The viscosity of gases in a transverse electric field. H. SIRK. *Phil. Mag.* **45**, 640(1923).—Note on paper of Ray (*C. A.* **16**, 2636). S. C. L.

The specific heat of saturated benzene vapor and the adiabatic curves for the liquid-vapor mixture. G. BRUHAT AND A. DELAYGUE. *J. phys. radium* **4**, 1–10(1923); cf. *C. A.* **16**, 2444.—The laws of thermodynamics were applied to the calcn. of the sp. heat of satd. benzene vapor. For lower temps. the heat of vaporization and for higher temps. the crit. consts. of C_6H_6 and the sp. heat of its vapor at low pressure were used in these calcns. The theoretical values for the lower and upper inversion points were found to be resp. 121° and 254°. From the values for the sp. heat of the satd. benzene vapor, the variation of entropy with temp. was calcd. Used with the tables of S. Young these results enable us to trace the adiabatic curves for liquid-vapor mixts. H. M. MCLAUGHLIN

The specific heats of nitrous and nitric oxides. J. R. PARTINGTON AND W. G. SHILLING. *Phil. Mag.* **45**, 416–30(1923).—Errors in older measurements are attributed to impure gases and special emphasis is laid on their purification. N_2O was prepd. by dropping a concd. soln. of $NaNO_2$ in air-free H_2O into a soln. of $NH_2OH.HCl$. The gas was passed through 50% NaOH soln. and dried by $CaCl_2$ and P_2O_5. NO_2 was prepd. by dropping a soln. of $K_4Fe(CN)_6$ and KNO_2 into dil. AcOH and drying the gas by KOH and P_2O_5. The exptl. method was that of Kundt as modified by Behn and Geiger recently described by Partington and Cant (*C. A.* **16**, 1530). By Berthelot's equation the results were calcd.: for NO at 12.2°, $C_p/C_v = 1.302$, $C_p = 8.799$ g. cals., $C_v = 6.758$ g. cals.; for NO_2, 1.400, 6.990 and 4.993, resp. S. C. LIND

Heat of oxidation of beryllium. H. COPAUX AND CH. PHILIPS. *Compt. rend.* **176**, 579–80(1923).—The heat of oxidation of Be was detd. by the indirect method of measuring separately the heats of soln. of the oxide and metal in HF. Be was prepd. by electrolysis. The sp. heat of the HF used was detd. in a Pt calorimeter. The mean value obtained for the sp. heat of Be was 131.3 Cal. L. T. FAIRHALL

Bureau of physico-chemical standards. (3rd annual report.) J. TIMMERMANS. *Bull. soc. chim. Belg.* **32**, 95–6(1923).—For measurements of *low temps.* standards of the following org. liquids, the m. p. of which has been detd. within 0.1° with the He thermometer of the cryogenic lab. at Leiden, have been prepd.: CCl_4, m. —22.9°; PhCl, m. 45.2°; $CHCl_3$, m. 63.5°; AcOEt, m. —83.6°; CS_2, m. —111.6°; Et_2O, m. (stable form) —116.3°; (unstable form) —123.3°; methyl cyclohexane, m. 126.3°. R. BEUTNER

The energy of atomic linkings in saturated and unsaturated hydrocarbons. J. P. WIBAUT. *Rec. trav. chim.* **41**, 441–60(1922).—J. J. Thomsen derived thermochem. consts. for the energy value of single, double and triple carbon linkings. Even from his latest writings it is not clear just how the calcd. consts. are related to the energy of the at. linkings. Without attacking the classical work of T., W. undertook a closer discussion of the exptl. data relating to hydrocarbon linkings with the following conclusions: A comparison of the heats of combustion of homologous olefins shows that

the energy of a double C linking is about 20 cal. less than twice the energy of a single C linking. Similar relations can be deduced for hydrocarbons with partially reduced aromatic rings and with aromatic rings. In these classes of compds. the difference in question amts. to 12–7 cal. In the above derivations the quantities used have a definite physical significance. The importance of heats of vaporization for such discussions as this is pointed out. In conjunction with the work of Fajans it was rendered probable that the value of a single C linking is at least 70 cal. Consequently the minimum value of a double C linking is about 120 cal. and that of a triple C linking is about 160 cal. Accordingly in the union of 2 CH_2 groups to form C_2H_4 more energy is liberated than in the union of 2 Me groups to form C_2H_6. No use was made of the C-H linking in the derivation here given. The conclusions, therefore, depend solely on the minimum value of the single C linking. The result of this thermochemical study is not in harmony with the usual stereochemical conceptions of the double linking between C atoms and with the conception that in such a linking a tension is present.

E. J. WITZEMANN

The mass law and statistical equilibrium. W. H. RODEBUSH. *Science* **57,** 358–9 (1923).—Since a true statistical equil. which dets. thermodynamic equil. demands a great no. of ions or mols. per cc., calcns. of concns. of 1 ion per l. or less in case of insol. sulfides are meaningless. Since ions exist as such in the crystals, the mechanism of reaction of solns. with solids is the same as between solns. B. S. N.

Fundamental properties of water vapor. I. M. STRAUVÉN. *Rev. universelle mines* **16,** 290–301(1923).—The subject is treated thermodynamically with diagrams. C. C. DAVIS

The behavior of metals following cathodic polarization. G. TAMMANN AND W. WIEDERHOLT. *Z. anorg. allgem. Chem.* **125,** 67–85(1923).—A study was made of the recovery (π, t) curves of a number of metallic couples following polarization. This included the influence of length of short-circuiting on the recovery of the electrode, the influence of electrolyte concn., temp. and arrangement of the electrode. The effect of length of time of short-circuiting on the recovery of the electrode is negligible. Various pairs of electrodes were short-circuited from 10 min. to 17 hrs. without any marked effect on the recovery. With decreasing concn. of electrolyte the polarization value decreases somewhat. The effect of an increase in temp. is to lower the value. The arrangement of the electrodes shows an effect on the polarization value. For instance, with Zn and Ag electrodes recovery was more rapid when the Ag electrode was arranged above the Zn electrode than in the reverse case. Recovery curves of metals streaked with the less noble of the couple were in general similar to those obtained after cathodic polarization. L. T. FAIRHALL

The specific resistance, temperature coefficient and thermal effect of ternary mixed crystals. KURT FISCHBECK. *Z. anorg. allgem. Chem.* **125,** 1–27(1923).—Au, Ag and Cu in pure form were fused together in various concns. and carefully tempered for 2–3 hrs. at 50–100°. By rolling and drawing the alloys were formed into wires of about 50 cm. length and 0.4 mm cross-section. The wires were tempered at 500° for 20 min. Measurements of the sp. resistance of these alloys indicate that in a Au-Ag-Cu mixed crystal the Ag and Cu may be exhanged without great change in the sp. resistance. Exchange of Au by Ag or Cu, however, alters the resistance markedly. The binary alloys of about 0.5 mol. Au and 0.5 mol. Cu have the lowest temp. coeff. of all binary and ternary Au-Ag-Cu alloys. The heat effect of these ternary alloys was measured against Cu at various temps. From data obtained with the hot junction at 100° and cold junction at 0°, F. has constructed the various surfaces for these alloys. The thermal effect increases rapidly with increasing temp. of both junctions as well as with increasing temp. difference of the two. A comprehensive review is given of the literature of sp. resistance, temp. coeff. and heat effect of ternary mixed crystals.

L. T. FAIRHALL

The electromotive behavior of silver-cadmium alloys. ERLING SCHREINER. *Z. anorg. allgem. Chem.* **125,** 173–84(1923).—S. has measured the e. m. f. of the cell Ag-Cd | N $CdSO_4$ | Cd for various concns. of the Ag-Cd alloy and at the two temps. 0° and 25°. For alloys of different compn. differences are obtained in the value of the temp. coeff. The potential measurements do not sharply indicate the two compds. Ag_2Cd_3 and AgCd. Graphic representation of the temp. coeffs., however, indicate maxima at 50, 60 and 80 at. % of Cd, corresponding to AgCd, Ag_2Cd_3 and $AgCd_4$. Measurement of the temp. coeff. of the e. m. f. of alloy cells is, therefore, of use as an empirical method for the study of the constitution of alloys. L. T. FAIRHALL

Electric potential of antimony-lead alloys. S. D. MUZAFFAR. *Trans. Faraday Soc.* (advance proof) **1923.**—Elec. potential measurements of Sb-Pb alloys made with a

quadrant electrometer against a calomel electrode in *N* KOH, *N* $Pb(NO_3)_2$ and tartar emetic with tartaric acid solns. show an identity of potential up to 98% Sb with that of Pb. There is, then, no solid soln. or chem. compd. formed between the 2 metals. A. G. PURDY

State of superconductivity of metals. C. A. CROMMELIN. *Rev. gen. sci.* **34,** 38–41 (1923).—Review of the work of K. Onnes on cond. at low temp. C. R. PARK

The dependence of the dielectric constant of benzene, acetone, and glycerol upon the temperature. W. GRAFFUNDER. *Ann. Physik* **70,** 225–49(1923).—First a critical survey of all previous work on dielec. consts., notably that of Debye, Clausius, Mosotti, Isnardi, Gans, and Bergholm, is made. An elec. vibration method was used for the detn. of the dielec. consts. The liquid under examn. was placed in a glass bulb. The electrodes were sealed in this bulb. The bulb contained an opening for a thermometer and one to allow for expansion of the liquid. The bulb was placed in a bath of petroleum, which was heated with steam or cooled with CO_2 snow. The dielec. const. of C_6H_6 was measured at 5° intervals between 5° and 80°, acetone from —32.9° to 54.0°, and glycerol from —5° to 99.2°. Many tables and curves are given. In general the results agree with those of previous investigators. R. F. SCHNEIDER

The measurement of the color of brown solutions, with special reference to tannin extracts. H. R. PROCTER. *J. Soc. Chem. Ind.* **42,** 73–9T(1923).—A review. Measurement of color is attempted on the analytic and the synthetic principles. In the former, the light is sepd. into its constituents by a prism and their intensities are measured by a photometer. In the synthetic, the fact is utilized that any color may be visually matched by a mixt. of light of 3 suitable colors or a single pure color and white light. An accurate means of measurement consists of measuring the depth of ext. soln. required to absorb $1/2$ or other definite portion of the light at 3 or 4 selected portions of the spectrum. These depths multiplied by their resp. concns. are inversely proportional to the absorptive power of the ext. for the particular spectrum color observed, and their reciprocals represent this for unit, Cl, where C = concn. and l thickness of layer. The simple character of the spectra of these brown solns. enables one to plot the entire color-curve from 3 or 4 points. Half-light curves for 20% iron alum, some typical tannin solns. and 3 ext. solns. are given. In practical measurements it is best to use the iron soln. in the variable cell. Details and examples of the mode of statement of color are given. W. H. BOYNTON

Rotatory power and anomalous dispersion of tartaric and malic acids. R. DE MALLEMANN. *J. phys. radium* **4,** 18–42(1923); cf. *C. A.* **16,** 901.—Previous work is reviewed and extended to include chlorides and nitrates of the alkalies and alk. earths, chlorides of Mg and Zn, Na_2SO_4, and $CaBr_2$. An equal effect seemed to be produced by CaI_2 but its study was difficult because of the free I_2 formed. The effect on the rotatory power increased in the order K, Li, NH_4, Na to a max. for Ca and then decreased in the order Sr, Ba, Mg, and Zn. In comparison with the dextro, the results with the *l*-tartaric acid were inverse and exactly sym.; those with *l*-malic were analogous and in the inverse sense. The neutral *d*-Et ester in aq. soln. showed extremely variable rotatory power; but in alc. and Et_2O this power was nearly const. The general conclusions with reference to the rotatory power apply also to dispersion. In explanation the soln. is considered to be a mixt. of two substances having different rotatory powers and different powers of dispersion. These two substances may result from combination with the solvent or with inactive substances in soln., from dissociation, isomerization or polymerization. H. M. MCLAUGHLIN

The optical constants of isolated tellurium crystals. G. D. VAN DYKE. *J. Optical Soc. Am.* **6,** 917–21(1922).—Measurements are given of the optical consts. for 5 different wave lengths in the visible spectrum. The crystals are birefringent, n being higher in the horizontal than in the vertical position. The reflecting power of the crystal varies but little for the 2 positions and for the various wave lengths, a fact verified by Sieg (unpublished) through direct measurement of the reflecting power. The curve obtained from plotting the values of n against the wave length shows a distinct min. and max. over the range investigated. This characteristic is also shown in Skinner's results (cf. *C. A.* **11,** 909) for Se, though to a far less degree. The peculiarity found in n in the horizontal position was not evident in Te, the χ indices following almost similar curves. C. C. DAVIS

The elementary magnetic moments. P. WEISS. *Anales soc. espan. fis. quim.* **20,** 379–82(1922).—A brief general discussion. L. E. GILSON

Longitudinal elasticity and Poisson's ratio of India rubber. G. B. DEODHAR. *Phil. Mag.* **45,** 471–9(1923).—Long and thick pieces of circular cross-section were used. Loads from 0.5 to 6 kg. were applied and the corresponding elongation and cross-section

were measured. Variations of Young's modulus (y) with load were exptly. studied. It was found there are two stages of stretching, initial and final, for which values of $L^2/y = k$ hold good, L being the stretched length. In the intermediate stages, where the length is between $^1/_4$ and 2 times that of the original, the linearity expressed by the formula does not hold. Poisson's ratio for India rubber is not a const. quantity, as is generally supposed, but diminishes with increasing length of the specimen. A further relation between stress and strain is necessary to satisfy the observations, which it is hoped to obtain from the theory of probability. S. C. LIND

Electromagnetic forces; rational fundamentals; revision of the laws (HERING) **4.** The nature of solid solutions (BAIN) **9.** System tin-arsenic (MANSURI) **9.**

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3—SUBATOMIC PHENOMENA AND RADIOCHEMISTRY

S. C. LIND

The structure of the atom. H. STANLEY ALLEN. *Chemistry & Ind.* **42**, 338–42 (1923).—A review. E. H.

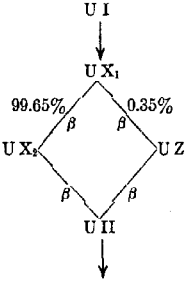
Electric theories of dyeing. Nature of electricity and its relations to chemical reactions. CAMILLE GILLET. *Rev. mat. gen. color.* **27**, 115–21, 136–40, 177–9(1922); **28**, 9–13, 26–9, 43–6(1923).—The conception that matter is formed of atoms of electricity is opposed by the idea that the material atom is formed of very small material particles called *atomic particles* to distinguish them from electrons, the latter being considered as the *atoms of electricity*. Heat and electricity are terms denoting radiant energy of 2 different states of matter, *viz.*, *atoms* and *atomic particles*. The various phys. and chem. phenomena are discussed from the point of view of the above-named conceptions. L. W. RIGGS

Stability of atom nuclei, the separation of isotopes, and the whole-number rule. WILLIAM D. HARKINS. *J. Franklin Inst.* **195**, 553–73(1923).—Review. Cf. *C. A.* **17**, 1374. JOSEPH S. HEPBURN

Atomic disintegration and atomic structure. W. GERLACH. *Fortschr. Mineral. Krist. Petr.* **7**, 113–56(1922).—A summary of the present knowledge of at. structure. E. F. HOLDEN

Report of the international committee on chemical elements. F. W. ASTON, *et al.* *J. Am. Chem. Soc.* **45**, 867–74(1923).—Tables recommended as presenting the most authentic data for the radioactive series of elements and consts. and for isotopes. G. L. CLARK

Uranium Z and its parent substance. O. HAHN. *Z. physik. Chem.* **103**, 461–80 (1923).—A method has been developed for the quant. detn. of the activity ratio U Z : U X. For a large series of U X prepns. of very different ages, a const. value (0.35%) has been obtained for this ratio. From this it is concluded that UX_1 is the parent of U Z. Accordingly, unlike any other known radioactive element, UX_1 undergoes a dual β-disintegration. The initial disintegration of U I is very probably as follows:



H. JERMAIN CREIGHTON

The distribution of the lengths of α-rays. IRÈNE CURIE. *Compt. rend.* **176**, 434–7 1923).—An app. was constructed with which the paths of α-rays emitted by Po were ecorded photographically. The lengths of the paths were about 5 cm. for the temp. nd pressure of the atm. used in the expts., and could be measured within 1%. The listribution of path lengths, *i. e.*, the no. comprised between $x - \Delta x$ and $x + \Delta x$, ollows closely the probability law Ke^{-kx^2}, which will give the length l of the most robable path. Another curve, which expresses as a function of x the no. of paths onger than x, will permit the detn. of the length p of some path by extrapolation, and hows that $p = l + 0.7$ mm. Geiger has found that $p = 3.92$ cm. Therefore for ir at 15° and 760 mm $l = 3.85$ cm. From the distribution curve the conclusion is rawn that the ionizing power of an α-particle along its path increases until it reaches ts max. about 3 or 4 mm. from the extremity, when it decreases greatly along the last ew mm. C. C. KIESS

Origin of radioactive disintegration. S. ROSSELAND. *Nature* **111**, 357(1923).—arlier investigators have called attention to the possibility that radioactive dis-

integration is due to disturbing effects of the electrons around the atom. Ordinary mechanics and electrodynamics do not account for the law of radioactive decay. On the basis of quantum postulates and the Bohr atom, it is shown that for U, the electrons in orbits with asimuthal no. of 1, the shortest distance from the nucleus attained by these electrons is of the same order of magnitude as the lower limit of the radius of the U nucleus as calcd. from the energy of the α-particle emitted from it. It is calcd. that elements of higher at. no. cannot exist. Considerations of resonance conditions necessary for at. explosions are discussed; such as relative frequencies of the nucleus and the surrounding electrons. D. C. BARDWELL

The mechanism of discharge in canal rays. H. BAERWALD. *Ann. Physik* **70,** 255–6(1923).—A correction of an error in a previous paper (*C. A.* **15,** 3027). The electrons in the space element of the rays are not as 200 to 1 but are about $200 \times v$ or 2×10^{10} to 1. The frequency of the collisions of the particles of the rays with the mols. and electrons of the gas is not as 200 to 1 but as 2×10^{10} to 1. R. F. SCHNEIDER

Ionization and resonance potentials. W. A. NOYES, JR. *Science* **57,** 314–8 (1923).—The various methods for measuring ionization and resonance potentials and a review of the work in this field are given. This work has done much to aid our idea of atomic structure but little from the standpoint of chem. combination. M. F.

The initial energy of thermionic electrons. L. H. GERMER. *Science* **57,** 392–3 (1923).—Using the exptl. method of Schottky (*C. A.* **8,** 3746), G. measures the fraction of the total number of electrons emitted by a filament which have sufficient initial energy to move against an opposing elec. field and arrive at a small opening in the cylinder surrounding the filament. The data are in good agreement with the theoretical equation based on Maxwell's distribution law. The temps. are from 1440° to 2475° K. M. FARNSWORTH

The kinetic energy of electrons emitted from a hot wire filament. J. H. JONES. *Proc. Roy. Soc.* (London) **102A,** 734–51(1923).—The results are given of a careful measurement of the energy of electrons emitted from a hot W filament placed along the axis of a cylindrical tube used as anode. The expt. consists of a measurement of the current potential curves for different temps., the energy of the electrons being deduced from these curves by means of well known formulas. The measurement of the currents was made by an arrangement previously used by Ting (*C. A.* **15,** 2238), modified to eliminate the disturbing factors which had lead Ting to erroneous results. When allowance is made for secondary effects and the inaccuracies resulting from the measurement of small currents the distribution of energy is found to agree with that given by Maxwell's law. These disturbing secondary effects, arising from contamination of the heated surface of the filament by gases, tend to increase the apparent energy of the electrons emitted by a factor amounting to as much as 20% in some cases. L. B. LOEB

Notes on the radiation and ionization potentials of the rare gases and on the singlet and enhanced series of argon. W. M. HICKS. *Phil. Mag.* **45,** 480–96(1923).—A discussion of recent exptl. evidence in support of H.'s previous theory (in his "Analysis of Spectra") of ionization potentials observed above the "true" value. For mol. gases like H_2 it was assumed that a certain potential is first necessary for dissociation and that the atom is afterwards ionized. In the rare gases ionization potentials are also observed above the true (spectral) values, and obviously dissociation cannot be the explanation. H. assumes a preliminary prepn. or absorption of energy. The various possibilities are discussed for He, and a true ionization potential of 4.75 v. is deduced, which is supported by the work of Kannenstine (*C. A.* **16,** 2634). The life of the prepd. or metastable atom is of the order $^1/_{220}$ sec., a very long period compared to mol. or ionic intervals. Similar treatments are carried through for Ne and A, and in addn. the singlets and doublets of A are treated by using the spectral evidence of various observers. S. C. LIND

Testing the expressions for the longitudinal and transverse masses of the electron. L. T. JONES AND W. C. POMEROY. *Phil. Mag.* **45,** 760–8(1923). S. C. L.

Crystal structure and chemical constitution. W. GRAHMANN. *Z. Kryst. Min.* **57,** 48–93(1922).—It is maintained that the distinction between atom lattices and mol. lattices is purely formal, since the geometrical resolution of mols. in the crystal lattice does not involve a loosening of chem. valencies. Crystal structure is detd. by the arrangement of atoms in the lattice and by the atom symmetry deduced from the total symmetry. At. symmetry is understood, not as a definite geometrical property of the atom, but as differing according to the arrangement of the valency electrons from compd. to compd. The structure of the NaCl lattice and the influence of valency on the crystal structure of elements are discussed. The structure of typical metals is

held to be mainly governed by the tendency to spherical packing, and not by valency electrons. Valency electron linking is correlated with anisotropy and elec. cond. J. C. S.

X-ray absorption coefficients of carbon, hydrogen and oxygen. A. R. Olson, Elmer Dershem and H. H. Storch. *Phys. Rev.* **21**, 30–7(1923).—The absorption coeffs. of H_2O and 6 org. liquids for X-rays of wave lengths 0.2 to 0.98 Å. were obtained by a precision ionization spectrometer app. The absorption measured included scattering. The variation with wave length is in accordance with the equation $\mu = A + B\lambda^3$, where for H_2O, C_6H_6, toluene, xylene, mesitylene, heptane and cyclohexanol the values of A are 3.5, 15.3, 19.0, 21.7, 24.2, 21.5 and 20.5, resp., and those for B are 44.5, 74.9, 85.3, 98.3, 113.6, 87.3 and 121.0, resp. These values give the coeffs. for 1 g.-mol. of each liquid in a cell 1 cm.² in cross section. The *mass absorption coeffs.* of H, C and O for X-rays of wave lengths 0.25 to 0.98 Å. are as follows: $\mu_H = 0.37 + 0.28\lambda^3$; $\mu_C = 0.18 + 1.01\lambda^3$; $\mu_O = 0.16 + 2.785\lambda^3$. The remarkable agreement between these values for C and O and Hewlett's values for graphitic C and liquid O (*C. A.* **17**, 680) proves the validity of the additive law. The curve for H suggests that the absorption of this element does not follow the cube law for wave lengths shorter than 0.65 Å., but is nearly const. down to 0.4 A. G. L. Clark

Refraction of X-rays in calcite. Bergen Davis and H. M. Terrill. *Proc. Nat. Acad. Sci.* **8**, 357–61(1922); cf. *C. A.* **17**, 362–3, 1753.—The method of detg. the index of refraction in X-ray spectra from the relative displacement of the several orders is applied to the reflection of the $K_{\alpha 1}$ of Mo from calcite. In the equation $n\lambda/2 \sin \theta_n = d(1 - \delta \cot^2 \theta_n)$, δ is evaluated from the increase in the apparent grating space with the order. It comes out 3×10^{-6}, though the error limits permit values from 0 to several times this. The value of δ from the angle of total reflection is $1.7 \pm 0.5 \times 10^{-6}$ and Lorentz' theoretical value is 1.85×10^{-6}. G. L. Clark

The element of atomic number 72. D. Coster and G. von Hevesy. *Naturwissenschaften* **11**, 133(1923); cf. *C. A.* **17**, 923.—X-ray investigation of a large no. of Zr minerals and com. Zr prepns. of varying origin showed that all samples gave lines which could originate only from an element with at. no. 72. A known amt. of Ta was mixed with the mineral and the intensity of the Ta lines compared with those from the element 72. In all com. Zr prepns., over 1% of the element 72 was found, in 1 case approx. 5%, and in the minerals 5–10% was present. Attempts to isolate the new element led to obtaining Zr free from it, and on the other hand to a mixt. of Zr contg. over 50% of the element. By applying the method used for sepg. quadrivalent elements, 9 lines of the L series in the X-ray spectrum of the element 72 were detected, *viz.*, α_1, α_2, β_1, β_2, β_3, β_4, γ_1, γ_2 and γ_3 (terminology of Siegbahn). The values agree within 10^{-11} cm. with those obtained by interpolation from the Lunder Inst. wave-length tables. The relative intensity of the lines is exactly analogous to that predicted by means of the known intensity of elements 71 and 73. The name *hafnium* is proposed for this *new element with atomic no. 72.* More detailed data on its sepn. and its at. wt. are soon to be published in the *Mitt. Kopenhagener Akad.* C. C. Davis

The coexistence of celtium (element 72) and the yttrium earth elements. G. Urbain and A. Dauvillier. *Compt. rend.* **176**, 622–3(1922); cf. *C. A.* **16**, 3804.—Polemical. It occurs, contrary to the views of Coster and Hevesy (*C. A.* **17**, 923) with Yt earths in *malakon* and *alvite*, in which it is a principal constituent. An element with the properties which 72 should have on Bohr's theory, would be found concd. in part in the final rare-earth nitrate mother liquors, where Ct was found by the authors. Urbain's conclusions in 1911 may have been erroneous, but the discovery of 72 in 1922 is beyond question. C. and H. can claim no more than the discovery in 1923 through Bohr's theory of a rich source of the previously known element, Ct. Norris F. Hall

Constitution of black Maketu sand. C. J. Smithells and F. S. Goucher. *Nature* **111**, 397(1923); cf. Scott, *C. A.* **17**, 1752.—Chemical and X-ray analyses show no new element in the sand, in agreement with the result of Coster and Hevesy (*C. A.* **17**, 1751) on Scott's prepn. The portion infusible in $NaHSO_4$ was easily fused with $KHSO_4$, and contained mainly Al and Fe. Norris F. Hall

Constitution of black Maketu sand. Alexander Scott. *Nature* **111**, 463 (1923).—A reply to the preceding abstract. Norris F. Hall

Urbain's celtium lines. H. M. Hansen and S. Werner. *Nature* **111**, 460(1923); cf. *C. A.* **17**, 1752.—The optical lines originally reported by U. in 1911 as due to "Ct," are found to occur in Eder's lists of the lines of Cp or Lu. This has been verified by examn. of a pure Cp prepn. In an impure specimen, however, only the lines originally ascribed by U. to Lu came out sharply. Thus the "discovery" of Ct in 1911 was due

to a difference in the behavior of two groups of lines in the Lu spectrum.
NORRIS F. HALL

Celtium and hafnium. D. COSTER AND G. HEVESY. *Nature* **111**, 462–3(1923).—Polemical. Urbain's "discovery" of Ct in 1911 is discredited on the ground stated in the preceding abstr. It is concluded that the "Ct" X-ray lines reported by Dauvillier in 1922 (*C. A.* **16**, 2638) were not due to contamination of his prepn. (presumably an impure specimen of $Lu(NO_3)_3$) by a trace of the element 72, but had some other source (Zr?). U. had attempted carefully to purify the specimen from all elements not rare earths, and, indeed its optical spectrum showed lines neither of Zr nor of element 72. Now Hf can easily be sepd. from rare earths, as can Zr, and it is unlikely that some Hf and no Zr would have survived U.'s purification. Further the 2 faint "Ct" lines were the only ones that deviate in wave length from Coster's measurements, (but cf. Dauvillier, *C. A.* **17**, 1752). The lines of the elements 70 and 71 agreed closely. C. and H. therefore reiterate their claim to priority and to the name hafnium.
NORRIS F. HALL

Hafnium, a new element. D. COSTER. *Chem. Weekblad* **20**, 122–3(1923).—General discussion of the agreement in the actual properties of Hf and those predicted by the new Bohr theory. Cf. *C. A.* **17**, 1751. R. BEUTNER

The theory of generalized quanta and the Balmer lines. S. C. KAR. *Phil. Mag.* **45**, 610–21(1923).—On theoretical grounds of statistics a new expression for the quanta integral is developed. The consequences are compared with those of the Sommerfeld theory and with Paschen's observations of the Balmer H lines. While the doublets and triplets receive no explanation since there is no splitting of energy as with Sommerfeld, the behavior of the Rydberg no. is somewhat more satisfactory. S. C. L.

Observations on absorption by iodine and other vapors. K. VOGT AND J. KOENIGSBERGER. *Z. Physik* **13**, 292–311(1923).—The selective continuous absorption, absorption bands and lines of vapors of I, Br, and NO_2 were detd. at various temps., d. of gas, and pressures. The selective continuous absorption range of I vapor is increased with rise in temp., but while the max. still remains at 5060 A. U. the intensity is decreased. Above 600° the selective absorption and absorption bands are less intense because of the progressive dissoc. of I mols.; also lines and groups appear which have no band arrangement but resemble multiple-line spectra. Beer's law is valid for I up to a d. of 5×10^{-5} ($H_2O = 1$); in the case of Br, Ribaud's detns. (*C. A.* **8**, 3527) are confirmed. Addn. of air increases the absorption only slightly on the side of max. to shorter wave lengths, and strongly on the side of longer wave lengths. The observed curve of continuous selective absorption in the region of the max. to the smaller wave lengths agrees with that calcd. theoretically; no such agreement is found on the side of longer wave lengths. On the av. only 1% of mols. is in a state of continuous absorption. The single absorption lines of Br spread at higher concns., and also those of I, Br, and NO_2, when the pressure is increased by other gases because of damping due to collision. Spreading due to other causes is of such a magnitude as to be below the resolving power of the grating. BENJAMIN S. NEUHAUSEN

Structure of the spectrum of scandium. M. A. CATALÁN. *Anales soc. espaň. fís. quím.* **20**, 606–23(1922).—The work of Fowler (*C. A.* **3**, 1365) is verified. The spectrum of Sc is composed of lines of two classes. The lines of the first class, characterized by their intensity, increase in relative intensity, compared to the other lines, when the temp. is decreased. They appear brighter in the sun spots than in the sun. They form doublets. The lines of the second class appear to increase more than the proportional amt. compared to the other lines when the temp. is increased. They appear more intense in the spectrum of the chromosphere than in that of the sun. They form triplets. Sommerfeld's rule for the displacement of spectra holds for Sc. The enhanced spectrum is analogous to that of the Ca arc. The spectrum of the Sc arc is composed of lines of both classes. Attention is called for the first time to 4 doublet lines of the type PP′. Extensive data are given in tabulated form. L. E. GILSON

The aspect of flame, arc, and spark rays of the arc spectra of metals in vacuo. ST. PROCOPIU. *Compt. rend.* **176**, 504–7(1923).—The aspect of the spectrum lines of various metals was studied when the source of light was operated *in vacuo*. The flame lines, of notation $1S - 1P$ and $1S - 1_{p_2}$, are emitted by particles existing in equal quantities throughout the length of the arc. The so-called arc lines, which are members of the two subordinate series, are emitted by particles which are more abundant in the vicinity of the cathode than at the cathode itself. The spark lines proceed from particles very close to the cathode; and, in the case of metals easily oxidized, they proceed from the anode as well. C. C. KIESS

The relationship between the arc spectrum of sodium and the first spark spectrum

of magnesium and the second spark spectrum of aluminium. E. FUES. *Z. Physik* **13**, 211–20(1923).—The assumption is made that the geometrical structures of the electronic hulls of neutral Na, Mg^+ and Al^{++} are similar, but that the dimensions of the two latter configurations bear the ratio λ to that of Na because of the greater central forces exerted by their nuclei. Whence it is shown that the spectra emitted by these 3 atoms are quant. related; and, that if the spectral data of neutral Na and also the Röntgen terms, say the L_1-terms, of Mg^+ and Al^{++} are known, then the corresponding spectral data for Mg^+ and Al^{++} can be calcd. As an example the term $1.5\mathfrak{S} = 236000$ was calcd. for Al^{++}, which agrees with that found exptly. within 2.8%. C. C. K.

The mechanism of photochemical processes. IV. The behavior of an equimolecular mixture of dry hydrogen and chlorine in ultra-violet light. ALFRED COEHN AND GERHARD JUNG. *Ber.* **56B**, 696–8(1923); cf. *C. A.* **17**, 1591.—Complete conversion into HCl took place under a 12-min. exposure to a quartz mercury-vapor lamp, whereas no reaction occurred under a screen of plain or uviol glass or after 20 days exposure to daylight. The active wave length accordingly lies below 254. G. R. FONDA

The "Colson-Russel-effect," "photochemical," "metal rays," "photo-activity" and other ray-like phenomena. E. RUMPF. *Jahrb. Radioakt. Elektronik* **19**, 214–22 (1923).—Many references are given to the work on the effect on a photographic plate of such substances as metals, H_2O_2, fats and other org. substances. Using Zn, R. shows that its action on a photographic plate cannot be due to a wave radiation or to electrons and concludes with Russel that the effect is due to a chem. reaction taking place on the surface which may be oxidation by traces of H_2O_2 M. FARNSWORTH

Some photoelectric experiments on platinum relating to the influence of gases L. A. WELO. *Phil. Mag.* **45**, 593–609(1923).—An exptl. examn. was made of the photoelec. effect on Pt in order to det. whether it is dependent on adsorbed gases. Instead of complete removal of the gases before the beginning of the observations, the course of the removal has been followed. The photoelec. effect, measured after cooling of the Pt, was plotted against the heating current. The wave-length limit of the exciting radiation proved to be const. but the largest variation in sensitiveness took place with the long waves. It is concluded that the primary emission from the Pt is const. but that an adsorbed layer of gas, whose effectiveness depends on the temp. of heating, stops the electrons of low velocity from escaping. The evidence is considered to be in favor of the transition-layer theory of adsorption and decidedly against the adsorbed layer consisting of a single layer of mols. After heating of the Pt the type of curve obtained is different and the emission always approaches a const. value far from zero. The gases merely modify and always reduce the electron emission. The min. of the original curves could not be reproduced by allowing the Pt foil to stand in various gases, but were reintroduced by heating with a blow-pipe. The minima are explained by resolving the degassing into two distinct processes, diffusion to the surface and release from it. At each temp., with given gas concn. in the Pt, a gas layer of characteristic thickness or density brings about the equiv. adjustment. S. C. LIND

Magnetic rotary dispersion in gases. T. H. HAVELOCK. *Phil. Mag.* **45**, 560–76 (1923).—Comparison is made between the ordinary dispersion of certain gases and that of magnetic rotation in regions free from absorption. Formulas derived from a simple static mol. with one type of vibration are sufficient for both dispersions in the visible spectrum for gases like H and N. The case of O in which $V\lambda^2$ (V is Verdet's const. and λ is wave length) decreases with decreasing λ indicates the necessity of including the magnetic properties of the mol. before a complete theory can be formed. Omitting paramagnetic effects, expressions for the rotary dispersions are obtained for an anisotropic static mol. such as has been used for the ordinary dispersion of H. Two formulas of this kind are compared with Sirks's observations in the ultra-violet (*C. A.* **7**, 3075); the modification used improves the agreement but not sufficiently to be satisfactory. Similar conclusions are reached after a numerical study of the Bohr H_2 mol., following Sommerfeld's analysis of the ordinary and magnetic dispersion. In all cases the adjustable consts. of the ordinary dispersion formulas were found by comparison with expts. on gases under ordinary conditions of temp. and pressure, while the available data for magnetic rotation were obtained under high pressure. The results may not be strictly comparable. Parallel sets of observations should be made on the same gas under similar conditions. S. C. L.

Some properties (photochemical sensitivity) of mercuric iodide (PRICE) **6**. Quantity of helium and other gases in Japanese natural gases (YAMADA) **8**. Electromagnetic forces; rational fundamentals; revision of the laws (HERING) **4**.

Atomes et électrons: Rapports et discussions du conseil de physique. Paris: Gauthier-Villars et Cie. 55 Quai des Grands-Augustins. 279 pp. F. 20.

BOHR, NIELS: **Über die Quantentheorie der Linienspektren.** Brunsiwck: F. Vieweg & Sohn. 168 pp.

Fortschritte auf dem Gebiete der Röntgenstrahlen. Hamburg: Gräfe & Sillem. 180 pp.

HOLST, HELGE and KRAMERS, H. A.: **Bohrs Atomteori. Almenfatteligt fremstillet.** Copenhagen: Gyldendal. 136 pp. Kr. 6.75.

KNOBEEVSKII, S.: **Constitution of Matter** (in Russian). Moscow: Gosisdat. 204 pp.

KNOBEEVSKII, S.: **What is Radium?** (in Russian). Moscow: Gosisdat. 116 pp.

4—ELECTROCHEMISTRY

COLIN G. FINK

Electromagnetic forces; a search for more rational fundamentals; a proposed revision of the laws. CARL HERING. *J. Am. Inst. Elec. Eng.* **42,** 139–54(1923); cf. *C. A.* **15,** 1857; **16,** 2064, 2268.—Recent researches make it desirable to revise the older laws of electromagnetic forces. Some of these older laws are inaccurate, incomplete, unnecessarily complicated, specify results contrary to fact, and are not universal. A new general law of mechanical motions in electromagnetic systems is proposed and many expts. are described which yield results in accordance with this new law and the consequent revisions in older laws. LOUIS JORDAN

Electric furnace practice. J. PERRIN. *J. four electrique* **32,** 38–40(1923).—A review. C. G. F.

Tests on the manufacture of ferro-tungsten. K. P. GRIGOROVITCH. *Rev. métal.* **20,** 183–8(1923).—Japanese sheelite (WO_3 68.79, CaO 16.9, Mn 0.28, Fe 3.87, SiO_2 2.11, Mo 0.18, Sn trace, S 4.14%, P none) was desulfurized by calcination. In 2 hrs. at 800° the S content was decreased to about 0.7%; subsequent washing with H_2O and with HCl removed but very little additional S. The 0.7% S is excessive for the manuf. of crucible high-speed steel, but not for elec. high-speed steel. Acid cement in the lining causes losses of 15–20%, and more, of WO_3 in the slag owing to the formation, at the working temp., of WO which is basic. Wood charcoal or petroleum coke is more effective and cheaper than ferro-Si for reducing the slag. The ferro-W sepd. into two layers, one quite fusible and of low W content, the other difficultly fusible and of high W content. The latter was very hard to remove from the furnace after cutting the current. The tests showed that the loss of W in the slag can be reduced to less than 1%. A. PAPINEAU-COUTURE

Electric smelting of magnetic sand. CHIWAKI KADOTA. *J. Chem. Ind.* (Japan) **25,** 1464–71(1922).—Economical use of Japanese magnetic sand has heretofore not been possible on account of the difficulty in smelting it in an ordinary blast furnace, due to the fine phys. state and high Ti content. K. devised a satisfactory smelting method. To produce 1 metric ton of white pig Fe, the following charge is used: 2 tons (metric) of magnetic sand (contg. 55% Fe, 0.1% P, 0.5% S), 0.5 tons of limestone and 1.0 ton of small coal (ash 10.5%, fixed C 52%). Carbon electrode consumption was 0.025 ton and 2400 kw. hrs. per charge were consumed. The product contains 0.2% P; the S content varies according to S content of the coal used. Gray pig iron can also be prepd. by this method but at higher cost. Costs of production are tabulated. S. T.

Electric-furnace detinning and production of synthetic gray iron from tin-plate scrap. C. E. WILLIAMS, C. E. SIMS AND C. A. NEWHALL. *Trans. Am. Electrochem. Soc.* **43,** preprint(1923).—Expts. were conducted in a small 25-kg. elec. furnace in which Sn plate was melted with various additions with the idea of eliminating the Sn. NaCl, FeS and basic slag were tried in turn. Practically no Sn was removed by melting with NaCl and C, the reducing atm. caused by the C undoubtedly preventing the formation of $SnCl_4$. Addition of NaCl but no C caused a volatilization of about 23% of the Sn present. The conclusions reached, however, were that in the elec. furnace complete detinning is impossible, and any detinning impractical. Melting tests conducted in the cupola showed that the amt. of detinning was dependent upon the extent of surface of metallic Sn exposed to the oxidizing gases, the detinning varying between 0% and 50%. Physical and mechanical tests showed that a Sn content of 1% or less did not seriously affect the properties of gray Fe. Synthetic cast Fe, contg. 3.78% C, 1.13% Si, 0.60% Mn, 0.56% P, trace of S and 1.23% of Sn, which was made from Sn

plate scrap plus tin-free scrap, was used successfully in making commercial castings of good quality. CHARLES H. ELDRIDGE

Electric bronze melting. G. BRASSEUR. *J. four electrique* **32**, 10–2(1923).—The inherent disadvantages accompanying the removal of Cu_2O by addition of P (or copper phosphide) in the usual elec. furnace practice are avoided by a new process. This method is used now at the Arbed Works, at Dommeldange (French pat. No. 488689, 494226–7). After the charge is melted in an elec. furnace, a strongly reducing alk. Mn slag is added and covered with C. This slag reduces the Cu_2O in the charge and is in turn reduced by the C. The induction furnace is ideally fitted for this process. Final alloys are high-grade and of easily controlled compn. Bearing, machine, and high-tensile Ni-Al bronzes are produced as well as brass and Cu castings. CHAS. H. ELDRIDGE

Electrolysis with aluminium anode, the anolytes being (I) solutions of sodium nitrite, (II) solutions of potassium oxalate. F. H. JEFFERY. *Trans. Faraday Soc.* (advance proof), **1923.**—(I) $NaNO_2$ solns. (*N*, 4*N*, and concd.) were electrolyzed at 0.4 amp., with an Al anode and a Pt cathode surrounded by 2 concentric porous pots. No evidence of the formation of the complex anion, $Al_x(NO_2)_y$, was obtained, the mechanism of the anodic reaction being the primary formation of $Al(NO_2)_3$ and subsequent hydrolysis. (II) With a porous pot as diaphragm, combinations consisting of an Al anode in $K_2C_2O_4$(*N*, 2*N*, and 4*N*) and a Pt cathode in $(COOH)_2$ (*N*, 2*N*, and satd., resp.) were electrolyzed at 0.05–0.3 amp. The Al went into soln. completely as complex anions, no gas being evolved below 0.3 amp. Colorless homogeneous crystals of $K_3[Al(C_2O_4)_3].3H_2O$ were crystd. from the anolyte. A. C. PURDY

The influence of the base metal on the structure of electrodeposits. W. BLUM AND H. S. RAWDON. *Trans. Am. Electrochem. Soc.* **43**, preprint(1923).—When cathodes of cast or annealed Cu are cleaned and etched (or pickled) with 1:1 HNO_3, the structure of the electrodeposit of Cu is a direct continuation of the structure of the cathode. When etching is omitted, the electrodeposit shows the characteristic structure of electrodeposited metal. With a sheet Cu cathode, which shows the typical deformed structure of cold-worked metal, the structure of the electrodeposit is fibrous. Cleaning was done with benzene and alc. followed by cathode suspension in an alkaline cyanide bath. In explanation, it seems that while the cleaning gives an electrically clean surface, the etching is required to expose the grain structure, so as to enable the electrodeposit to build up on the original structure, and thus to continue it. Excellent micrographs bring out findings. Future work will be to extend this study to dissimilar metals and alloys. CHAS. H. ELDRIDGE

The Sörderberg continuous electrode and its first applications in Italy. LIVIO CAMBI. *Giorn. chim. ind. applicata* **5**, 7–9(1922).—A description of the Italian plants making use of this electrode. A sketch and photograph are given. R. S. P.

Brightness of tungsten. W. E. FORSYTHE. *Phys. Rev.* **19**, 436–7(1922).—The brightness of W in candles per sq. cm. has been measured by 3 methods for a wide range of temps. E. J. C.

The thermoelectric gas producer (STASSANO) **21.** Electrotitration with the aid of the air electrode (FURMAN) **7.** Metallizing ceramic articles (U. S. pat. 1,452,281) **19.**

Storage battery. W. H. WOOD. U. S. 1,451,003, Apr. 10. Porous wood separators are impregnated with $MgSO_4$ or an alkali metal sulfate for use in "bone dry" shipped batteries which are readily prepd. for service.

Storage batteries. W. H. THORPE. U. S. 1,451,347–8, Apr. 10. Structural features.

Storage batteries. C. W. HAZELETT. Can. 229,447, Mar. 6, 1923. A storage battery contains plates of alternate polarity not greater than $^3/_{64}$ in. in thickness and separators of fibrous material between the plates which extend past the edges thereof. The plates are formed by perforating thin sheets of Pb. The perforations are filled with paste and the plates are assembled with separators between plates of opposite polarity.

Storage batteries. JNO. GORDON. Can. 229,714, Mar. 20, 1923.

Storage battery plates. C. M. ANGELL. U. S. 1,451,801, Apr. 17. A series of pasted plates are dried and then electrolyzed while in spaced parallel arrangement.

"High-power" dry battery. A. A. WELLS. U. S. 1,452,230, Apr. 17. The battery comprises a Zn can electrode contg. a C electrode and a depolarizing mass comprising conducting C and an insol. oxidizing agent such as MnO_2 between the Zn and C elec-

trodes with localized bodies contg. C only or a greater proportion of C than the bulk of the depolarizing mass and which serve to obtain high amperage.

Zinc dry battery cans. F. G. BREYER and W. H. FINKELDEY. U. S. 1,451,758, Apr. 17. The Zn material for battery cans is washed with a soln. of Na_2CO_3 and Na (or K) silicate to cleanse its surface so as to obtain uniform corrosion of the metal in the normal action of the battery.

Electrode for arc cutting or reducing. C. J. HOLSLAG. U. S. 1,451,392, Apr. 10. The graphite or other main material of the electrode is formed in 2 layers or sections between which is interposed an O-liberating compd., *e. g.*, $K_2Cr_2O_7$, MnO_2 or BaO_2, mixed with asbestos and Na silicate. The electrode may be coated with silicate of Na and ground asbestos.

Metal anodes for electrodeposition. G. B. HOGABOOM. Can. 230,076, Apr. 3, 1923. An anode of metal has its rate of corrosion increased from that presented by the metal in its cast, rolled or electrolytic form by varying its cryst. structure by heat treatment. A suspension member of the same metal but of different cryst. structure may be welded to the anode. Cf. *C. A.* **17**, 370.

Electrolytic iron. F. A. EUSTIS, C. R. HAYWARD, H. M. SCHLEICHER and D. BELCHER. U. S. 1,451,333, Apr. 10. A ferric soln. is electrolytically reduced to the ferrous state and the ferrous soln. is then transferred to a sep. electrolytic cell to which the ferric soln. does not have access and Fe is deposited from it. Cf. *C. A.* **17**, 1596.

Electrolytic malleable nickel and nickel alloys. N. V. HYBINETTE. Can. 229,448, Mar. 6, 1923. The electrolyte is kept in condition by withdrawing it from the tank, boiling it in the presence of a basic ppt. of Ni and returning it to the tank for further use.

Manufacture of hydrogen, carbon monoxide or mixtures of these gases. A. Foss, B. F. HALVORSEN and N. STEPHANSEN. Can. 229,570, Mar. 13, 1923. A mixt. of CO_2 and water vapor is subjected to the action of an elec. arc in the presence of S. The S may be in the form of a metal sulfide and the metallic oxides may be sepd. from the resulting gases by a magnetic field.

Apparatus for electrolyzing fused materials. T. KOLKIN. Can. 229,332, Mar. 6, 1923.

Electrolytic apparatus. J. N. SMITH and F. G. CLARK. Can. 229,237, Apr. 27, 1923. The app. specified is particularly applicable to the electrolysis of water. Cf. *C. A.* **17**, 1759.

Apparatus for electrolysis. JAMES N. SMITH. Can. 229,239, Feb. 27, 1923.

Electrolytic apparatus. WM. G. ALLAN. Can. 229,241, Feb. 27, 1923.

Apparatus for electric precipitation of suspended particles from gases. E. P. DILLON and A. A. HEIMROD. U. S. 1,451,418, Apr. 10.

Electric furnaces. WM. E. MOORE, H. F. ALTER, ED. A. HANFF, J. R. ECKLEY and F. WRIGHT. Can. 229,248, Feb. 27, 1923. An elec. furnace of the rocking type has a counterbalanced door arched outwardly. There is an outwardly extending flame, protecting flange or lip at the lower edge of the door and a renewable electrode holder consisting of a water-cooled bifurcated body with hinged joint sections and adjustable clamp wings. Cf. *C. A.* **17**, 693, 694.

Electric furnace. M. H. BENNETT. Can. 229,737, Mar. 20, 1923. Means are provided in an elec. furnace for delivering polyphase heating current directly to the charge so as to set up a rotating magnetic field or fields in the charge and means for setting up current flow in proximity to the charge which establishes a rotating magnetic field in the charge additional to, and coacting with, the field set up by the heating current.

Electric furnace. M. H. BENNETT. Can. 229,738, Mar. 20, 1923. An elec. furnace has a plurality of circuits, a plurality of electrodes and an automatic controlling mechanism for maintaining such resistance in each circuit as will cause all the electrodes to deliver energy at a predetd. rate and each electrode to deliver its proportion thereof. The controlling mechanism is operated by any variation in the power delivered.

Melting non-ferrous metals. M. H. BENNETT. Can. 229,736, Mar. 20, 1923. In melting metals of high thermal cond. in an elec. furnace, the delivery of elec. energy across a resistance zone between the electrodes and charge is so controlled that during fusing the heat developed at or near the electrodes will be conducted away through the charge before the temp. rises sufficiently to cause undue production of fumes. A rotating magnetic field may be set up in the fused metal to cause circulation.

Smelting ores of low-volatile metals in an electric furnace. J. H. GRAY. Can. 229,715, Mar. 20, 1923. Heat is provided for smelting ores of low-volatile metals by maintaining an arc between two electrodes of different diams., the material of the larger

electrode having a lower current-carrying capacity than that of the smaller electrode. Furnace is specified.

Electric furnaces for calcining carbonaceous material. F. A. J. FITZGERALD. Can. 230,075, Apr. 3, 1923.

Electroplating. M. M. MERRITT. Can. 229,734, Mar. 20, 1923. This pat. relates to an app. and elec. and mech. features of treatment for the *electrodeposition of Cu* or other metals upon wire or other flexible cathodes.

Electroplating with zinc. J. HAAS, JR. U. S. 1,451,543, Apr. 10. Zn deposition from a cyanide bath is carried out in the presence of Hg to produce a coating of Zn alloyed with a small proportion of Hg. This coating is adapted for use on Fe or steel.

Vapor arc lamp. H. C. RENTSCHLER. U. S. 1,451,271, Apr. 10. An arc is obtained having a "rising characteristic" by employment of a Hg cathode and an anode of W or other refractory material in an evacuated enclosure contg. A.

Filaments. G. R. FONDA. Can. 229,382, Mar. 6, 1923. A filament of ductile W is produced by mech. working, heating in H to 1000–1300° to remove surface impurities and plating with Fe and finally heating to 1600° to produce a homogeneous alloy.

5—PHOTOGRAPHY

Aging and decay of potassium sulfite-quinol developer. J. PINNOW. *Z. wiss. Phot.* **22**, 72–80(1922).—The changes are reviewed which this developer undergoes by the action of O of the air. Potassium quinolsulfonate is a slow and comparatively weak developer. No evidence was obtained of the formation of sulfonic acid in the sulfite-quinol mixt. at room temp. G. R. FONDA

Colored photographic images. L. F. DOUGLASS. U. S. 1,450,412, Apr. 3. A black Ag photographic image is replaced by an iron blue-toned image and the converted image is treated with a basic dye such as Fuchsin P and Auramin O and then treated with an alk. soln., *e. g.*, a soln. formed from $Pb(NO_3)_2$ and NaOH, to effect mordanting.

Cellulosic photographic films. J. E. BRANDENBERGER. U. S. 1,450,479, Apr. 3. Viscose films, etc., are moistened with H_2O, freed from surplus liquid by expression and then treated with a gelatin photographic emulsion to form a sensitive layer on its surface. Two films are doubled together while one side of each is coated.

Recovering silver from photographic solutions. L. WEISBERG. U. S. 1,448,475. Mar. 13. Ag is pptd. by use of sugar and alkali, *e. g.*, NaOH.

6—INORGANIC CHEMISTRY

H. I. SCHLESINGER

Method of representing coördinated compounds. T. M. LOWRY. *J. Soc. Chem. Ind.* **42**, 224–5(1923).—Use is made of the fact that an octahedron resting upon one of its triangular faces has a hexagonal outline when viewed from above. The 2, 4, 6-positions are connected by straight lines to represent the edges of the upper octahedron face and the 1, 3, 5-positions by dotted lines to represent the lower face. The enantiomorphism of the different types of molecular asymmetry is made readily apparent by this system.



Type $[MeA_3BCD]$ Type $[MeABC_2D_2]$ Type $[MeABen_2]$ Type $[Meen_3]$

Various advantages of this method of representation are pointed out.

A. R. MIDDLETON

Potassium dioxalato-dipyridino iridites. MARCEL DELÉPINE. *Compt. rend.* **176**, 445–7(1923); cf. *C. A.* **17**, 1197.—It was expected that replacement of C_2O_4 in $K_3[IrCl_4C_2O_4]$ by pyridine (Py) would establish simply by the color of the salt, red or orange, the relative positions of the 2 Py residues. Expt. showed that Cl and not C_2O_4 was replaced, with formation of $K_2[IrCl_2PyC_2O_4]$, well crystd. Action of Py

for 4 hrs. at 130° on *d*-? *cis*-$K_3[IrCl_2(C_2O_4)_2]$ gave about 25% yield of a well crystd., yellow salt of the expected compn., $K[IrPy_2(C_2O_4)_2]$, and a yellow amorphous powder of the same compn. The crystals were octahedral with $6H_2O$, very efflorescent, and clinorhombic with $2H_2O$, not efflorescent. Treatment of the crystals with HCl-HNO_3 yielded $[IrPy_2Cl_4]$ which with NH_3 gave the same products as the chloride of the *red* salts. Action of HCl on the yellow crystals yielded a series of compds. one of which, $[IrPy_2Cl_4][IrPy_2(H_2O)_2Cl_2]$, gave with KOH *red* $K[IrPy_2Cl_4]$. $K_3[Ir(C_2O_4)_3]$ treated with Py as above gave the same products as the dichloro compd. Attempts to split the dipyridino compd. with strychnine failed. The conclusion became unavoidable that the Py mols. occupy *trans* positions and that at 130° during 4 hrs. the *cis*-dichloro oxalate had changed to *trans*. This conclusion was reinforced by finding that *trans*-dichlorodioxalato salt gave the same products in better yield and in less time. The amorphous yellow products with HCl were found to yield an orange salt but the amorphous character of both them and their strychnine salts prevented successful results from attempts at splitting them into optical isomers. A. R. MIDDLETON

The triple nitrites of nickel. V. CUTTICA AND G. CAROBBI. *Gazz. chim. ital.* **52**, II, 270–9(1922).—A continuation of work on the prepn. of triple nitrites of Ni and on the formulation of these complexes in accordance with the coördination theory (*C. A.* **16**, 2645). The formula $[Ni(NO_2)_6]M^I_2M^{II}$ is not valid for all these compds. Because of their dissociation in H_2O the ion $[Ni(NO_2)_6]^{----}$ belongs to the imperfect complex ions. In general with the accumulation of electronegative radicals in a complex ion the ionic dissociation of its salts increases. Thus the equil. $[Ni(NO_2)_6]K_4 \rightleftarrows 4K + [Ni(NO_2)_6]^{----}$ is displaced almost completely to the right as well as $[Ni(NO_2)_6]^{----} \rightleftarrows Ni(NO_2)_2 + 4NO_2^-$. Cryoscopic detns. on some of these triple nitrites showed that the solns. contain almost exclusively the simple ions. The soly. of $HgCl_2$ in H_2O is greatly increased by adding KNO_2. After removing the undissolved $HgCl_2$ from such a soln. a satd. soln. of $NiSO_4$ was added and then much excess solid KNO_2. A yellow microcryst. powder sepd. slowly which was removed and washed with KNO_2 soln. and then EtOH and Et_2O. The product was the *triple nitrite of Ni-Hg-K*, (I) $Hg(NO_2)_2.Ni(NO_2)_2.2KNO_2$. The compn. is like that of similar NO_2 salts of Ni-Ba-K; Ni-Ca-K; Ni-Sr-K; Ni-Pb-K; Ni-Cd-NH_4. Cryoscopic detns. on aq. solns. of I showed it to be nearly completely broken down to simple ions. To a $HgCl_2$ soln. in $NaNO_2$, like the above, excess solid $TlNO_2$ was added. After sepg. the TlCl ppt. satd. $NiSO_4$ soln. was added when the *triple nitrite of Ni-Hg-Tl*, $3Ni(NO_2)_2.2Hg(NO_2)_2.6TlNO_2$, sepd. as orange-yellow crystals. When prepd. in another way the complex $2Ni(NO_2)_2.Hg(NO_2)_2.8TlNO_2$ sepd. as an orange-colored salt. Concd. solns. of $Ni(NO_2)_2$ and $Zn(NO_2)$ (from $ZnSO_4 + Ba(NO_2)_2$) were mixed and treated with excess KNO_2. The *triple nitrite of Ni-Zn-K*, $2Ni(NO_2)_2.Zn(NO_2)_2.8KNO_2$, sepd. as meat-red crystals. It is represented as $2[[Ni(NO_2)_6]K_4].Zn(NO_2)_2$, not much unlike $[Ni(NO_2)_6]K_4.2Cd(NO_2)_2$ (*C. A.* **16**, 2645). A *triple nitrite of Ni-UO_2-Tl* was sepd. as a chestnut colored salt which did not have a simple formula. $Ni(NO_2)_2$ (from $Ba(NO_2)_2 + NiSO_4$) with $CoCl_3$ and a small excess of KNO_2 sepd. greenish yellow *triple nitrite of Ni-Co-K*, $3Co(NO_2)_2.Ni(NO_2)_2.10KNO_2$, which is considered to be either $2K_4[Co(NO_2)_6].[Co(NO_2)_6]^{K_2}_{Ni}$ or $2K_4[Co(NO_2)_6].[Ni(NO_2)_6]^{K_2}_{Co}$. On mixing concd. solns. of $Ni(NO_2)_2$ and $Co(NO_2)_2$ with a large excess of solid $TlNO_3$ the *triple nitrite of Ni-Co-Tl*, $Ni(NO_2)_2.Co(NO_2)_2.6TlNO_2$ sepd. as a dark red salt, which is formulated thus: $[Co(NO_2)_6]^{Tl_2}_{Ni}.4TlNO_2$. The property of Ni of giving rise to complex nitrites in whose constitution 2 other bases (1 alk. and 1 bivalent) take place is widely developed. As alk. metals, K and Tl were used, but Rb and Cs probably would behave similarly. The coördinating action of Ni is exercised in a large field but is not intense enough to det. a const. arrangement of at. groups stable to the dissociating action of H_2O. Only in some cases do the triple nitrites of Ni fit in with the classical coördination theory. E. J. WITZEMANN

The triple nitrites of bivalent cobalt. V. CUTTICA AND M. PAOLETTI. *Gazz. chim. ital.* **52**, II, 279–86(1922).—This paper is an extension of the study of triple nitrites of Co. The existing knowledge of these complexes is reviewed. The 3 existing triple nitrites of Co^{III} are $Co(NO_2)_2.Ba(Ca, Sr)(NO_2)_2.2KNO_2$ (*Erdmann, J. prakt. chem.* **97**, 385). In contact with H_2O these salts decompose and leave an insol. residue $K_2Co(NO_2)_4$. The relations are summarized thus: $[Co(NO_2)_4]'' + 2NO_2' \longrightarrow [Co(NO_2)_6]''''$ and $[Co(NO_2)_6]'''' + 2K^+ + Ca^{++}(Ba, Sr) \rightleftarrows [Co(NO_2)_6]^{K_2}_{Ca}(Ba, Sr)$. The coördination in these Co complexes is much stronger than in the Ni complexes (cf. preceding abstr.). Triple nitrites of Ni with Na are unknown but with Co the triple

salt $[Co(NO_2)_6]Ba_2.NaNO_2$ was obtained. The alk. earth element was replaced by Zn, Cd and Hg. Mixing concd. solns. of $CoCl_2$ and $CaCl_2$ and adding much KNO_2 causes the sepn. of the *triple nitrite of Co-Ca-K*, $Co(NO_2)_2.Ca(NO_2)_2.2KNO_2$, as a dirty green ppt. From concd. solns. of $Co(NO_2)_2$ and $Ba(NO_2)_2$ when mixed and treated with excess $TlNO_2$ the *triple nitrite of Co-Ba-Tl*, $Co(NO_2)_2.Ba(NO_2)_2.2TlNO_2$, sepd. as a chestnut colored ppt. From solns. of $BaCl_2$, $Ba(NO_2)_2$ and $NaNO_2$ the *triple nitrite of Co-Ba-Na*, $Co(NO_2)_2.2Ba(NO_2)_2.NaNO_2$ sepd. as a nasty green powder. From solns. of $CoCl_2$, $Zn(OAc)_2$ and excess KNO_2 the *triple nitrite of Co-Zn-K* (I), $2Co(NO_2)_2.Zn(NO_2)_2.6KNO_2$, was obtained as a dark yellow salt. Excess KNO_2 added to a mixt. of $CoCl_2$ and $Cd(OAc)_2$ solns. pptd. the *triple nitrite of Co-Cd-K* (II), $2Co(NO_2)_2.Cd(NO_2)_2 6KNO_2$ as a chestnut-colored product. $HgCl_2$ in KNO_2 soln. probably forms a complex and on adding $CoCl_2$ and excess KNO_2 the *triple nitrite of Co-Hg-K* (III), $2Co(NO_2)_2.Hg(NO_2)_2.6KNO_2$, seps. as a dark chestnut ppt. I, II and III are all quite stable in air. They are partially sol. in H_2O leaving the yellow compd. $K_3Co(NO_2)_6$ in suspension. Their constitution is therefore considered to be $[Co(NO_2)_6]^{Zn}_{2K_6}(Cd, Hg)$. In the case of the Ni salts corresponding to I, II and III the 5 salts known have different compns. and break down completely in H_2O. It is probable that the greater regularity of the Co salts depends on the formation of the highly stable little sol. $K_3Co(NO_2)_6$ which serves as a basis for the mol. structure of these triple nitrites. E. J. W.

The transformation of light magnesia to heavy magnesia. N. Parravano and C. Mazzetti. *Ann. chim. applicata* **7**, 3–12(1923).—Complete data with graphs are given of work, the general results of which have already been published (cf. *C. A.* **15**, 2597). After addn. of distd. H_2O to the calcined samples, they were dried to const. wt. over H_2SO_4, for when dried in an oven at 100° analysis showed an absorption of CO_2 of 2% by wt. Light MgO is probably amorphous and heavy MgO cryst. (periclase). Transformation occurs at all temps., and impurities accelerate this process according to the reaction suggested by Le Chatelier and Bogitch for quartz into tridymite (cf. *C. A.* **11**, 2952). The amorphous form is less stable than the cryst. at all temps. and dissolves in the flux formed by the impurities. This soln. is supersatd. with respect to the cryst. form and pptn. of the latter occurs. C. C. Davis

Some properties of mercuric iodide. T. S. Price. *Chemistry & Industry* **42**, 292–3(1923).—A review of observations on the yellow and red modifications of HgI_2. Gelatin tends to stabilize the yellow iodide while gum arabic causes rapid settling of larger particles of the red iodide. The photochemical sensitivity of HgI_2, red or yellow, is largely affected by temp., though neither is as sensitive as the silver halides. The double salt of HgI_2 and AgI is but slightly sensitive to light, which is remarkable since each component is fairly photosensitive. W. H. Boynton

Examination of the alleged antimonious hydroxides. Charles Lea and J. K. Wood. *J. Chem. Soc.* **123**, 259–65(1923).—The action of HCl on hydrated Sb_2O_3 has been studied. While the results of the expts. do not actually disprove the definite existence of hydroxides of Sb, they show that under the conditions specified by Clarke and Stallo (cf. *Ber.* **13**, 1792) the ppt. obtained does not correspond in compn. with H_3SbO_3, and that the compn. of the product obtained by Long's method (cf. *J. Am. Chem. Soc.* **17**, 87) varies according to the temp. of prepn., approximating $Sb_2O_3.{}^1/_2H_2O$ at ordinary temp. Since hydrated Sb_2O_3 is more feeble as an acid than as a base, there is little tendency for the formation of adsorption compds. with the precipitant when the substance is pptd. by an alk. reagent. On filtering and washing the product prepd. in this way, condensation can, therefore, proceed unchecked and the almost anhydrous oxide is obtained more readily than when an acid precipitant is employed.
H. Jermain Creighton

The action of phosphoric anhydride on water. M. A. Rakuzin and A. A. Arseniev. *Chem.-Ztg.* **47**, 195(1923).—By adding P_2O_5 in ${}^1/_2$ g. portions to H_2O violent reaction occurred until H_3PO_4 was formed; additional quantities entered soln. slowly until P_2O_5 amounted to 520% of the original H_2O. From the sirupy soln. crystals of tetraphosphoric acid, $H_6P_4O_{13}$, were pptd. after standing 5 days. Heretofore salts of this acid have been made by fusing together requisite amts. of ortho- and metaphosphates, etc., but the free acid has not been prepd. The $H_6P_4O_{13}$ m. 34°; d. is 1.8886.
W. C. Ebaugh

Interaction of ammonium hydroxide and mercurous bromide. J. G. F. Druce. *Chem. News* **126**, 225–6(1923).—From earlier work (cf. *C. A.* **16**, 213) it was concluded that the action of NH_4OH on Hg_2Cl_2 was represented by $2NH_4OH + Hg_2Cl_2 = NH_2Hg_2Cl + NH_4Cl + 2H_2O$. A similar study shows that the bromide acts thus: $Hg_2Br_2 + 2NH_4OH = NH_2HgBr + Hg + NH_4Br + 2H_2O$. The black ppt. formed amal-

gamated readily with Cl, and upon boiling with NH_4Br globules of Hg were obtained. A repetition of expts. with the chloride gave similar results, so it is concluded that the product is really $NH_2HgCl + Hg$. W. C. EBAUGH

Conditions of reaction of hydrogen with sulfur. R. G. W. NORRISH AND E. K. RIDEAL. *J. Chem. Soc.* **123**, 696–705(1923).—Study of the reaction between H and S at temps. below the b. p. of S by a dynamic method has demonstrated that combination takes place by way of 2 reactions: (1) a gaseous reaction proportional to the pressure of the H, (2) a surface reaction independent of the pressure of the H. The temp. coeffs. of these reactions are 2.19 and 1.48, resp. The reaction does not show a false equil. below 350° as stated by Pelabon (cf. *Compt. rend.* **124**, 686). The heats of activation of the gaseous and surface reactions are 52400 and 26200 cal., resp., the former being exactly twice the latter. This is explained on the assumption that the S mols. can become activated in 2 stages. H. JERMAIN CREIGHTON

Complex ions formed by silver salts and ethylenediamine in aqueous solution. P. JOB. *Compt. rend.* **176**, 442–5(1923).—Measurements of the change in the potential of a Ag electrode in a soln. of $C_2H_4(NH_2)_2$ to which varying amts. of $AgNO_3$ were added showed that 2 complex ions of the formulas $Ag[C_2H_4(NH_2)_2]_2$ and $Ag.C_2H_4(NH_2)$ were formed. The latter exists only when the diamine soln. is very dil. The equil. consts. and heats of formation (from Ag^+ and diamine) are 6.8×10^7 and 10^5, resp., and 6700 cal. and 10300 cal., resp. The theory of the method by which the compn. of the ions was detd. is given in detail. T. S. CARSWELL

Factors influencing compound formation and solubility in fused salt mixtures (KENDALL, *et al.*) **2.**

KOHLRAUSCH: **Short Textbook for Inorganic Practice** (in Russian). Charkow: Ukrain, Gosisdat.

RIEKE, REINHOLD: **Die Arbeitsmethoden der Silikatchemie.** 2nd Ed. Brunswick: F. Vieweg & Son. 100 pp.

RIPPEL, JOHANN: **Anorganische Chemie für die Oberstufe der Realgymnasien.** 2nd Ed. revised. Vienna: F. Deuticke. 209 pp.

7—ANALYTICAL CHEMISTRY

WILLIAM T. HALL

Electrotitration with the aid of the air electrode. N. H. FURMAN. *Trans. Am. Electrochem. Soc.* **43**, preprint(1923).—An extension of previous work (cf. *C. A.* **17**, 505) shows that the air electrode may be used satisfactorily in the titration of mixts. of chromate, dichromate and acid. The air electrode may also be used for approx. H-ion detn. M. KNOBEL

Uses of amalgams in quantitative analysis. VII. Estimation of phosphoric acid. SHIN-ICHIRO HAKOMORI. *J. Chem. Soc. Japan* **43**, 734–7(1922).—The method described for detg. H_3PO_4 is similar to the usual $KMnO_4$ method for the detn. of P in steel. Cd-Hg can be substituted for Zn-Hg. S. T.

The sensitiveness of the reaction between thiosulfate and acid. O. HACKL. *Chem.-Ztg.* **47**, 174(1923).—Thiosulfate is commonly detected by the liberation of S when the aq. soln. is made acid. The reaction, however, is not very sensitive and is not given within less than 5 min. in the cold with 100 cc. of soln. contg. 1 mg. $S_2O_3^{--}$ per cc. W. T. H.

The silver nitrate reaction with thiosulfate and its sensitiveness. O. HACKL. *Chem.-Ztg.* **47**, 210(1923).—The reaction between Ag ion and S_2O_3 ion is so sensitive that 0.1 mg. of the latter in 100 cc. of water can be detected. In an acid soln. the test is not delicate. W. T. H.

The adsorption of acids by hydrated alumina precipitates. A. CHARRIOU. *Compt. rend.* **176**, 679–82(1923).—When $Al(OH)_3$ is pptd. from a soln. contg. alkali chromate, the ppt. is colored pale yellow and the adsorbed CrO_4 ion is not removed by washing with hot water, nor with hot solns. of NH_4Cl, NH_4NO_3 or $AcONH_4$. The quantity of CrO_4 ion adsorbed by the $Al(OH)_3$ increases as the chromate soln. is made more concd. There is no evidence of appreciable quantities of alkali cation being adsorbed. If, instead of pptg. the $Al(OH)_3$ with NH_4OH, a soln. of NH_4HCO_3 is used, there is no adsorption of CrO_4 ion in the cold. Moreover, adsorbed CrO_4 ion may be removed from a ppt. of $Al(OH)_3$ by washing with cold NH_4HCO_3 soln. Similarly, a ppt. of $Al(OH)_3$

adsorbs PO_4 ion more readily than it does CrO_4 ion. $Al(OH)_3$ gel, therefore, tends to adsorb bivalent CrO_4 ion but it has a greater tendency to adsorb CO_3 ion or PO_4 ion. To remove adsorbed CrO_4 ion in quant. analysis, it is merely necessary to wash the $Al(OH)_3$ ppt. with 5% NH_4HCO_3 soln. W. T. H.

Microscopic detection of nitrogen in organic and inorganic substances. A. IONESCU AND C. HAROVESCU. *Bull. soc. chim. Romania* **4,** 61–5(1923).—A satd. soln. of picric acid in ethyl malonate or in alc. contg. 5% of glycerol may be used as a sensitive test for NH_3. Yellow, characteristic crystals are obtained which are easy to recognize with magnifications of 300–500 diameters. Less than 0.1 mg. of NH_3 can be detected. W. T. H.

A rapid volumetric method for the determination of carbonic acid in mine dusts containing carbonates. WILLIAM MCD. MACKEY AND WILLIAM WARD. *Colliery Guardian* **125,** 516; *Iron Coal Trades Rev.* **106,** 303–4(1923).—A method is given based on the direct vol. measurement of CO_2. A definite amt. of dust is placed in a flask provided with a funnel with stopcock and with a tube (with stopcock) leading to two measuring tubes similar to those of a Hempel app. These tubes contain H_2O satd. with CO_2 and the funnel contains HCl satd. with CO_2. The dust is treated with HCl and the CO_2 evolved is measured under atm. pressure in the graduated tube. Mixts. of coal dust and pptd. $CaCO_3$ give low results, owing to tar preventing the HCl acting on the very fine particles. Four reliable tests per hr. can be made. C. C. DAVIS

Modification of Gillespie's method for the determination of hydrogen-ion concentration. WM. D. HATFIELD. *J. Am. Chem. Soc.* **45,** 940–3(1923).—This modification of Gillespie's method (cf. *C. A.* **14,** 1797) is well suited to the av. technical lab., on account of its accuracy, simplicity of technic, and the use of ordinary c. p. "Analyzed" salts for the prepn. of buffer solns. H. JERMAIN CREIGHTON

Estimation of lead dioxide. C. R. SOMAYAJULU. *Proc. Science Assoc. Maharajah's College, Vizianagram,* Dec. 1922, 1–5.—A volumetric detn. of PbO_2, professed to be more reliable than that of Bunsen, of Lux, or of Dichl and Topf. Add 0.2 g. of pure As_2O_3 and 20–30 cc. of 10% NaOH to 0.25 g. of PbO_2, heat gently to the b. p., and add dil. H_2SO_4, while stirring, until a permanent ppt. appears. Add an excess of satd. $NaHCO_3$ and titrate with 0.1 *N* I. Approx. 25 cc. is required according to the reactions: $2PbO_2 + As_2O_3 \longrightarrow As_2O_5 + 2PbO$ and $As_2O_3 + 2H_2O + 2I_2 \longrightarrow As_2O_5 + 4HI$. $KMnO_4$ soln. may be used instead of I (cf. Moser and Perjatel, *C. A.* **6,** 3071). PbO_2 from the electrolysis of $Pb(NO_3)_2$ in HNO_3 analyzed 99.93% and Dennstedt PbO 98.52%. C. C. DAVIS

Titration of calcium hypochlorite. I. M. KOLTHOFF. *Pharm. Weekblad* **60,** 241–8 (1923); *Rec. trav. chim.* **41,** 740–50(1922).—With fresh samples the iodometric method of Bunsen gives results in agreement with the modified method of Penot and that of Pontius, but with old samples it gives higher values. This is due to the presence of chlorite in old and especially in moist samples, which reacts with KI in the presence of H_2SO_4 but not in the presence of $NaHCO_3$. A. W. DOX

Remark on the article of A. Lottermoser: "Technical estimation of the colloidal component in tungsten powders." J. A. M. VAN LIEMPT. *Kolloid Z.* **132,** 118–9 (1923); cf. *C. A.* **16,** 1372.—A third method in addn. to L.'s 2 methods depends on the different rates of decompn. of H_2O_2 according to the degree of subdivision of the metal added. Example: 1 g. of the W powder is added to 50 cc. of 0.1 *N* H_2O_2 and is kept in the thermostat at 20° for 1 hr. The remaining H_2O_2 is titrated with 0.1 *N* $KMnO_4$. The decompn. of H_2O_2 with the time is practically a linear function. A. MUTSCHELLER

Colorimetric determination of calcium. A. GRÉGOIRE, E. CARPIAUX, E. LAROSE AND T. SOLA. *Bull. soc. chim. Belg.* **32,** 123–30(1923).—In extremely dil. solns. contg. 0.005–0.010 mg. Ca in 50 cc., Ca may be detd. by the pale yellow color of a colloidal soln. of Ca oleate. Reagent *A.*—20 g. Rochelle salt and 7.5 g. KOH dissolved in 100 cc. of water. Reagent *B.*—2 g. oleic acid and 0.5 g. KOH dissolved in 400 cc. alc. and diluted to 1 l. Treat the soln. to be tested with 1 cc. of each reagent, dil. to 50 cc., shake and allow to stand 1 hr. before comparing the color with that produced similarly by known amts. of Ca. Since Mg gives a similar color, it must be removed. Evap. with HNO_3 to dryness in a Pt dish, heat to redness to form the oxides and dissolve the CaO in water free from CO_2. R. BEUTNER

Colorimetric determination of magnesium. A. GRÉGOIRE AND T. SOLA. *Bull. soc. chim. Belg.* **32,** 131–6(1923).—The method is similar to that described for Ca (preceding abstr.). Treat the soln. contg. 0.008–0.1 mg. of MgO with 2 cc. of a reagent contg. 100 g. NH_4Cl and 9 g. NH_3 per liter and with 1 cc. of a reagent contg. 2 g. oleic acid and 0.5 g. KOH in 600 cc. of alc. and 400 cc. water. Dil. the soln. to 50 cc. and

allowed to stand 2 hrs. before comparing the color with that obtained with known quantities of Mg. Ca must be absent and can be removed as described in the previous paper. R. BEUTNER

Analysis of fluorspar. C. E. GIFFORD. *Ind. Eng. Chem.* **15**, 526(1923).—Treat 1 g. of powdered fluorspar with 10 cc. of 10% AcOH, heating 30 mins. on the steam bath. Filter and wash the undissolved silica, fluorides, etc., with hot water. Evap. the soln. with H_2SO_4, take up the residue in a little HCl, dil. and det. Fe, Al, Ca and Mg in the usual way. From the wt. of CaO deduct 0.0011 g. to allow for dissolved CaF_2 and calc. the remainder of the Ca and Mg as carbonates. Ignite and weigh the residue from the AcOH treatment. Evap. with HF and call the loss in wt. SiO_2. Evap. twice with H_2SO_4 to convert all fluoride to sulfate. Dissolve the residual sulfates in water contg. a little HCl and 0.5% H_2SO_4. Filter, ignite and weigh any residual $BaSO_4$, finally testing with H_2SO_4 again to make sure that it was not undecomposed CaF_2. Neutralize the last soln. with NH_4OH, add 5 cc. HCl and test with H_2S to see if any Pb is present, which can be detd. in the usual way. Continue with the detn. of Fe, Al, Ca and Mg, testing for Zn in the filtrate from the NH_4OH pptn. and remembering to add the 0.0011 g. of CaO. S can be detd. by Martin's method (*C. A.* **4**, 2079). W. T. H.

Rapid electrolytic estimation of mercury. A. DE MEEÛS. *Bull. soc. chim. Belg.* **31**, 302–23(1922); cf. Böttger, *C. A.* **15**, 482, 3043.—A study of the factors which are said to cause inaccuracies in the electrolytic estn. of Hg. Good results were obtained with a Pt cathode, but Au was found to be more suitable for the purpose as the H deposit is more adherent and so permits of the use of alc. and ether for washing; in the case of other metals this should be done with water only, as the more rapid method occasions loss. Expts. carried out with mercuric salts in presence of substances which form complexes give similar results with gold and Pt cathodes, but the method is more satisfactory when simple acid electrolytes are used as solvents. The method is applicable to mercurous salts, which are oxidized before electrolysis. J. C. S.

Detection of antimony and tin in the qualitative analytical scheme. E. RUPP. *Ber. pharm. Ges.* **32**, 334–5(1922).—Instead of the Zn-Pt couple, the expt. is modified as follows: In a test-tube contg. a small Fe nail heat the HCl soln. of Sn and Sb to boiling for at least 1.5 min., adding more HCl if necessary to produce a vigorous evolution of H_2. Decant the clear liquid and test for Sn with $HgCl_2$. In the presence of Sb, the nail will have become blackened and some Sb may ppt. in the form of lustrous crystals. Dry the nail by rolling it between filter paper, then heat in an ignition tube over a small flame. A white sublimate of Sb_2O_3 becomes golden yellow in contact with H_2S-H_2O. 0.08 mg. of Sb can be detected in this way. As under like treatment gradually colors the nail brownish black. W. O. E.

A test for traces of arsenic. O. BILLETER. *Helvetica Chim. Acta* **6**, 258–9(1923).—It is claimed that 2×10^{-6} mg. of As may be detected by distg. $AsCl_3$, catching the distillate in fuming HNO_3, evapg. to dryness and testing the residual H_3AsO_4 in the Marsh app. W. T. H.

The detection of peroxides and per salts. A. BLANKART. *Helvetica Chim. Acta* **6**, 233–8(1923).—The behavior of 6 reagents toward solns. of Na_2O_2, $K_2C_2O_6$, Na_2CO_4, $Na_2CO_3.H_2O_2$, $NaBO_3$, $Na_2HPO_4.H_2O_2$, $Na_4P_2O_7.H_2O_2$ and $Na_2S_2O_8$ is described and by means of these tests it is usually possible to tell what peroxide or per salt is present. (1) A soln. of *p*-aminophenol in alc. gives a deep blue to black coloration when shaken with Na_2O_2 soln. BaO_2 gives the same reaction but more slowly. MgO_2 does not give the test nor do any of the per salts. The presence of 1% Na_2O_2 can be detected in $NaHCO_3$ mixts. (2) A 30% soln. of KI gives no test with Na_2O_2, $Na_2CO_3.H_2O_2$ or $Na_4P_2O_7$ but gives brown colorations with the other per salts. The solid substance should be added to the reagent. A permanent brown coloration is obtained only when the soln. is alk. with a little $NaHCO_3$ and when H_2O_2, or salts which yield it by hydrolysis, are absent. (3) 0.05 *N* $AgNO_3$, treated with solid peroxides and salts, reacts in the opposite manner. If Ag is at once deposited, H_2O_2 is present. Pure Na_2CO_4 gives yellow Ag_2CO_4 at first which turns gray in 10–20 mins. Older samples usually give the latter effect sooner. $Na_2CO_3.H_2O_2$ gives black Ag with evolution of O_2. Perborates do not respond to this test when they are very pure, but if they contain Na_2O_2, brown Ag_2O is formed which decomposes slowly. Persulfates do not react with $AgNO_3$. In neutral or dil. acid solns. they gradually hydrolyze and then cause deposition of Ag. $Na_4P_2O_7.H_2O_2$ gives a white ppt. with $AgNO_3$. (4) Freshly prepd. aniline water gives brown colorations with Na_2CO_4, $NaBO_3$, $Na_2HPO_4.H_2O_2$ and $Na_2S_2O_8$. (5) A dil. soln. of cochineal when shaken with solid peroxides and per salts gives valuable indications. Decolorization results when free alkali hydroxide is present and with Na_2O_2,

Na_2CO_4 and to some extent with $NaBO_3$. Red ppts. are obtained with $Na_2CO_4.H_2O_2$, $Na_2HPO_4.H_2O_2$ and $Na_4P_2O_7.H_2O_2$. (6) A 0.25% soln. of $Co(NO_3)_2$ is covered with a little benzene and then a little of the solid to be tested is added. The color of the ppts. depend upon the alkalinity. Na_2O_2 gives a brown ppt. or greenish if Na_2CO_3 is present. Na_2CO_4 ppts. a green, basic salt. The ppt. is more grayish with $Na_2CO_3.H_2O_2$. $NaBO_3$ gives a more brownish ppt. which is grayish if soda is present. $Na_4P_2O_7.H_2O_2$ gives a blue ppt. or a brown one in the presence of Na_2CO_3. With $Na_2HPO_4.H_2O_2$ a pink ppt. is obtained, which becomes browner upon the addition of soda. With $Na_2S_2O_8$ a pink coloration is obtained or a violet one with soda. W. T. H.

The determination of lead as phosphate and its separation from lead, copper, and cadmium. G. LUFF. *Chem.-Ztg.* **47**, 133–4(1923).—The method is similar to that of Schoeller and Waterhouse (*C. A.* **15**, 641). The pptn. of the Bi as phosphate takes place in a vol. of 120 cc., at 100° and the soln. contains 5 cc. of concd. HNO_3. The ppt. is allowed to stand 10 hrs. before filtering, is washed with cold water and ignited wet in a quartz crucible. W. T. H.

The determination of phosphorus in vanadium ores. F. W. KRIESEL. *Chem.-Ztg.* **47**, 177–8(1923).—In the analysis of ores rich in V considerable difficulty was encountered in getting satisfactory results for P. After a trial of various procedures, the most satisfactory method was found to depend upon the pptn. of PO_4 with SnO_2, fusion of the ppt. with KCN, pptn. of any V with $K_4Fe(CN)_6$ and finally the pptn. of PO_4 with $(NH_4)_2MoO_4$ soln. Treat 10 g. of ore with 75 cc. of concd. HCl and 45 cc. of water. After there is no further solvent effect, oxidize the soln. with a little HNO_3, add 30 cc. of 18 *N* H_2SO_4 and evap. to fumes. Cool, digest with 100 cc. of water and filter off any $PbSO_4$ and SiO_2. Add to the filtrate 50 cc. of concd. HNO_3 and 1 to 2 g. of pure granulated Sn. Shake until the reaction ceases and allow to stand overnight. Dil. with 400 cc. of hot water, filter and wash the ppt. of hydrated SnO_2, adsorbed PO_4 and a little VO_4. Dry and ignite in a porcelain crucible which causes volatilization of a part of the As. Fuse with 5 g. KCN in a covered Ni crucible. Ext. with hot water and filter off the Sn. The soln. now contains all the P, traces of Cu and a small quantity of V. Add 20 cc. of concd. HCl and boil off the HCN for 20 min. under a good hood. Transfer the soln. to a 500 cc. calibrated flask, ppt. the V with a slight excess of $K_4Fe(CN)_6$, which can be detected on the spot plate with uranyl soln. or with molybdate. About 0.5 g. of dissolved $K_4Fe(CN)_6$ is sufficient. Make up to 500 cc., filter through a plaited filter and take 450 cc. for the P detn. Add $AlCl_3$ soln. (free from Fe) equiv. to 0.1 g. Al and ppt. in the cold with a very slight excess of NH_3. Filter and wash the ppt. with water. Dissolve the alumina ppt. in HCl, evap. to dryness to remove traces of SiO_2, adding a little $KClO_3$ during the evapn. if any Prussian blue appears. Take up the residue in HNO_3, filter and ppt. the P in the filtrate with $(NH_4)_2MoO_4$ and weigh as $P_2O_5.24MoO_3$. The ores analyzed by this method contained about 0.2 g. P. W. T. H.

A commercial method for the analysis of light aluminium alloys. PH. PASCAL. *Chimie et industrie* **9**, 264–9(1923).—A scheme of analysis is given for the detn. of Al, Mg, Zn, Mn, Cu, Fe and Si in light alloys. Dissolve 2 g. of alloy in 40 cc. of 1:1 HNO_3, dil. to 200 cc. and electrolyze for Cu and PbO_2 with 0.5 amp. In 15 min. the Pb is deposited on the anode. Add 10 cc. of 1:1 H_2SO_4, and electrolyze for 3 hrs. with 1–1.5 amp. To 2 g. of sample add 50 cc. of hot H_2O, 25 cc. of 20% NaOH, and 1 cc. of 10% Na_2CO_3. When evolution of gas ceases, add 1 cc. of alc., heat to boiling, filter *rapidly*, transfer the residue to the filter, and wash with boiling water till the washings are neutral. The soln. contains Al, Zn and traces of Mn, and the residue Cu, Mn, Fe, Si, Mg, Ca. Heat the soln. to boiling, add 5 cc. of 10% Na_2S (formation of a black ppt. indicates improper sepn. due to slow filtration or to too low a temp., and the analysis should be started again), filter, wash with H_2S water, dissolve ZnS in dil. HCl, boil, add excess of Na_2CO_3, boil, filter, wash, ignite, and weigh. Acidify an aliquot (=0.2 g. of alloy) of the filtrate from the ZnS with HCl, boil to drive off H_2S, add NaOH to slight pptn. and just redissolve with HCl, cool, add equal vols. of 25% KI and of satd. KIO_3, stir, let stand 5 min., decolorize with 20% $Na_2S_2O_3$, add a little more KI-KIO_3 mixt. and then 2 cc. of $Na_2S_2O_3$, heat gently for 30 min., filter, wash with boiling water, ignite, and weigh as Al_2O_3. Dissolve off the filter the residue from the alk. treatment of the sample in aq. regia, wash with boiling water, add a few cc. of 1:1 H_2SO_4, evap. to white fumes, take up with water, transfer to a 250-cc. beaker, add 20 cc. of 15% $(NH_4)_2S_2O_8$, heat to 60°, add slowly 1:1 NH_3 to slight excess, boil 5 min., let cool, filter off the MnO_2, wash with boiling water till free from H_2SO_4, and discard the filter. To the filtrate add 10 cc. of 10% NH_4Cl, 50 cc. of a mixt. of equal vols. of 10% $NaNH_4HPO_4$ and 10% citric acid, and one-quarter of the total vol. of concd. NH_3, rub the sides of the beaker

to start pptn., and after 2 hrs. filter, wash with dil. NH_3, dry, ignite and weigh as $Mg_2P_2O_7$. For extra-light alloys (chiefly Mg) proceed as follows. Treat 2 g. of alloy with 20 cc. of 50% HNO_3 and 10 cc. of 50% H_2SO_4, or else take the soln. in which the Pb and Cu were electrolyzed. In either case, add an excess of NH_3 to the boiling soln., filter, wash, ignite, and weigh as Al_2O_3, correcting for Fe if necessary. In the filtrate ppt. the Zn with 10% Na_2S, filter, redissolve in HCl, reppt. as $ZnCO_3$, filter, wash, ignite and weigh as ZnO. Make the filtrate distinctly acid with HCl, boil to drive off H_2S, filter if necessary, and in an aliquot (=0.2 g. of alloy) ppt. Mg as above. To det. Mn., take 0.2 g. of light alloy (Duralumin, etc.) or 2 g. of extra-light alloy (Elektron, etc.) in a 350-cc. Erlenmeyer flask, add 20 cc. of HNO_3 (d. 1.2) and 0.5 cc. HF (to facilitate soln. and prevent pptn. of MnO_2), heat gently on a sand bath till NO_2 fumes are completely driven off, heat to boiling, remove from the bath and add immediately 10 cc. of H_2O, 20 cc. of 0.01 *N* $AgNO_3$ and 0.5 g. of pulverized $(NH_4)_2S_2O_8$. Let stand till the color of $HMnO_4$ has developed, add 200 cc. of H_2O, and titrate with As_2O_3 soln. (0.650 g. per l.), 10 cc. of which = 1 mg. of Mn. The As_2O_3 should be standardized against a standard Mn soln. Si and Fe are detd. on a sep. portion of sample by the usual methods. A. P.-C.

A simple method for the determination of tin in iron and steel. E. P. BARRETT AND J. D. SULLIVAN. Bur. Mines, *Repts. Investigations* No. **2459**, 4 pp.(1923).—The following method has been found useful for detg. Sn in Sn-plate scrap. Place 3–5 g. of fine drillings in an Fe crucible and fuse with a little Na_2SO_3. Dissolve the melt in water, make acid with HCl and add 50 cc. of concd. HCl in excess. Transfer the soln. to a 700-cc. Erlenmeyer flask contg. a coiled strip of sheet Pb. Heat gently until the reduction of the Sn is complete. Continue heating for about 90 mins. after all the Fe has been reduced to Fe^{++}. Add a little marble to give an atm. of CO_2 and, when cold, add more marble and some starch paste. Titrate the Sn^{++} with standard I_2 soln. W. T. H.

Iodometric estimation of copper in bronze and brass. G. BATTA AND G. LATHIERS. *Bull. soc. chim. Belg.* **31**, 297–302(1922).—The application of the iodometric method of Cu estn. to bronze and brass gives results which are of sufficient accuracy for many purposes. It is rapid and useful when electrolytic methods cannot be employed. J. C. S.

Interferometric analysis of liquid mixtures of organic substances. E. COHEN AND H. R. BRUINS. *Z. physik. Chem.* **103**, 337–48(1923).—The causes of the difficulties encountered in using the Zeiss interferometer to analyze solns. in organic liquids are discussed; and the precautions are considered which are necessary in order that the measurements have the same degree of accuracy as in the case of aq. solns. H. JERMAIN CREIGHTON

The estimation of oxygen in organic compounds. H. TER MEULEN. *Rec. trav. chim.* **41**, 509–14(1922).—For the principle of the method see *C. A.* **16**, 2823. In this paper the app. is illustrated and details of assembly and manipulation are fully described. E. J. WITZEMANN

The estimation of formaldehyde and acetaldehyde. E. W. BLAIR AND T. S. WHEELER. *Analyst* **48**, 110–2(1923).—In studying the action of O_2 and O_3 on hydrocarbons it was necessary to det. HCHO, H_2O_2, HCO_2H and a trace of O_3 in the presence of one another. The routine method of Romijn was found accurate for pure, dil. solns. of HCHO but in some expts. CH_3CHO was present and caused trouble. The KCN method of titrating HCHO, as described by Sutton, but by using only 50 cc. of soln., was found satisfactory in such cases and good results for both aldehydes were obtained by Ripper's bisulfite method. For the detn. of all the constituents listed above, the following method of analysis was adopted: (1) HCO_2H was detd. in an aliquot part by titrating with 0.01 *N* NaOH, methyl red or phenolphthalein being used as indicator. (2) O_3 was detd. in the neutralized soln. by adding KI followed by HCl and titration with $Na_2S_2O_3$ soln. (3) An aliquot part of the soln. was neutralized and 5 g. of KI were added which, upon being shaken, destroyed the O_3. 50 cc. of 12 *N* H_2SO_4 were added and after 5 mins. the soln. was dild. and titrated with $Na_2S_2O_3$ soln. (4) To det. HCHO, the same procedure was repeated as in (3) to destroy O_3 and H_2O_2 and then, without titrating the liberated I_2, the soln. was neutralized with NaOH and the HCHO detd. by the method of Romijn. W. T. H.

The detection of methanol in ethyl alcohol. H. W. VAN URK. *Pharm. Weekblad* **60**, 273–6(1923).—On the basis of comparative tests with the various methods in use, U. recommends the following procedure. Distil the sample according to the German official method. Oxidize the distillate with a heated oxidized Cu spiral, and apply the Dèniges reaction with Schiff's reagent in the presence of strong acid. A

positive reaction should be confirmed by the morphine-H_2SO_4 test which is known to be specific for CH_2O. A. W. Dox

Destruction of organic matter in the Kjeldahl method with V salt (PARRI) **12.** Some new reactions for the detection of sterols (WHITBY) **11B.** Standards for reagent chemicals (COLLINS) **2.**

SWEET, ANDREW THOMAS: **Fire Assaying.** Houghton, Mich.: Mich. Coll. Mines, Dept. Metallurgy and Ore Dressing. 95 pp.

8—MINERALOGICAL AND GEOLOGICAL CHEMISTRY

EDGAR T. WHERRY AND EDW. F. HOLDEN

New minerals. A. SCHWANTKE. *Fortsch. Mineral. Krist. Petr.* **7,** 157–74(1922).—A review of recent descriptions of new minerals. E. F. H.

The coefficients of thermal expansion of minerals and rocks and artificial materials of corresponding composition. K. SCHULZ. *Fortsch. Mineral. Krist. Petr.* **7,** 327–426 (1922).—Abstracts of 125 papers (published from 1901–20) are given, with an index by authors and substances. E. F. H.

The immersion method. K. SPANGENBERG. *Fortsch. Mineral. Krist. Petr.* **7,** 3–64(1922).—A comprehensive summary of the theory and practice of the immersion method for detg. *ns.*, with a bibliography (75 entries). E. F. H.

Determination of the specific gravities of halite and calcite by the röntgenometric method. F. RINNE. *Centr. Mineral. Geol.* **1923,** 1–2.—The X-ray method outlined below offers, in many cases, a means for detg. the sp. gr. of a pure substance which is preferable to older methods. Accurate results can be obtained even though the material used may contain cavities or inclusions of foreign material. The method consists of accurate X-ray detn. of the vol. (V) of the unit cell of the substance, and calcn. of the no. of mols. in the cell (n). Then, the mol. wt. (M) and Avogadro's number (N) being known, the sp. gr. (s) can be calcd. from the relation

$$V.s/n = M/N \text{ or } s = n.M/V.N$$

The values obtained for s in the cases of *halite* and *calcite* were 2.1647 and 2.7101, resp. J. E. GILL

Siderite and associated minerals from the Columbia River basalt at Spokane, Washington. E. V. SHANNON. *Proc. U. S. Nat. Museum* **62,** 1–19(1923).—The minerals identified include feldspar (oligoclase-andesine), magnetite, cristobalite, siderite, pyrite, iron-opal, hyalite, calcite, aragonite, barite, limonite, and goethite. The phys. and crystallographic features of these are described. The order in which they were deposited in the basalt cavities is nearly that of the above list, the siderite (spherosiderite) showing 2 generations. L. W. RIGGS

Schoepite, a new uranium mineral from Kasolo, Belgian Congo. T. L. WALKER. *Am. Mineral.* **8,** 67–9(1923).—This mineral is named in honor of Prof. Alfred Schoep (Ghent). It was found with other alteration products of uraninite. The color is sulfur yellow, luster adamantine. The crystals are not more than 1.5 mm. long by 1 mm. in diam. There is perfect cleavage // (001). Under the microscope fragments are transparent; α 1.690, β 1.714, γ 1.735, all ± 0.003; strong pleochroism, X (normal to cleavage) colorless, Y and Z lemon yellow; extinction always parallel; Bx_a normal to cleavage; 2V large; opt.—; $\rho > \nu$. Qual. tests suggest a U carbonate; not enough material was available for quant. analysis. It is orthorhombic, $a:b:c = 0.426:1:0.865$; forms: $c(001)$, $a(100)$, $b(010)$, $m(110)$, $d(011)$, $f(021)$, $e(041)$, $x(104)$, $o(122)$, $q(124)$, and $p(111)$. E. F. H.

Note on enstatite, hypersthene, and actinolite. H. S. WASHINGTON AND H. E. MERWIN. *Am. Mineral.* **8,** 63–7(1923).—Enstatite from Espedalen, Norway:—light smoke gray color, translucent; opt. +, α 1.666, β 1.670, γ 1.675, 2V 75° *ca.*; d (29°) 3.254; compn: SiO_2 57.28, TiO_2 0.05, Al_2O_3 0.90, Fe_2O_3 0.42, FeO 6.43, MnO trace, MgO 34.94, CaO 0.13, Na_2O 0.22, K_2O 0.01, H_2O^+ 0.13, sum 100.51%. Hypersthene from **Nain, Labrador:** grayish black, silky luster; contains 5–10% monoclinic pyroxene, 1% ilmenite (?) as inclusions; α 1.690, γ 1.700; d (29°) 3.415; SiO_2 51.81, TiO_2 0.76, Al_2O_3 2.16, Fe_2O_3 4.52, FeO 13.96, MnO 0.16, MgO 24.57, CaO 1.95, Na_2O 0.39, K_2O 0.03, H_2O^+ 0.19, sum 100.50%. The mol. compn. is given. Actinolite from

Krageroe, Norway: brownish black, powder dark dull greenish yellow; sections 0.1 mm. thick show pleochroism in dull to greenish yellow; d (28°) 3.079; α 1.636, β 1.650–3, γ 1.660; extinction angle 15–22°, 2V (estd.) 75° *ca.*; SiO_2 51.86, TiO_2 1.92, Al_2O_3 3.81, Fe_2O_3 2.19, FeO 5.97, MnO 0.04, MgO 19.40, CaO 10.73, Na_2O 2.16, K_2O 0.28, H_2O^+ 0.98, F_2 (0.46), sum 99.58% (corrected for O = F). Stanley (*C. A.* **1**, 399) has analyzed material from the same locality with similar results. In this work the analyses were by H. S. W., optical detns. by H. E. M., and d. detns. by L. H. Adams. E. F. H.

Babingtonite from the contact metamorphic deposits of the Yakuki Mine, Province Iwaki, Japan. MANJIRÔ WATANABÉ. *Am. J. Sci.* **4**, 159–64(1922).—At this locality babingtonite is associated with garnet, hedenbergite, calcite, quartz, magnetite, and ilvaite. Fifteen crystal forms were identified, 4 new for the mineral: j (102), l (201), q (111), z (023). [Dauber's orientation.] The mineral is black and nearly opaque; strongly pleochroic, X deep emerald green, Y purple brown, Z deep brown. α 1.715, β 1.725, γ 1.740; biaxial, +. E. F. H.

Catapleiite from Magnet Cove, Ark. WM. F. FOSHAG. *Am. Mineral.* **8**, 70–2 (1923).—Catapleiite occurs in soln. cavities in feldspar-aegirite dike rocks. The mineral forms hexagonal plates up to 3 mm. in diam. and 1 mm. thick, of ivory-yellow color, and translucent. The forms noted (referred to the hexagonal system): (0001), (10$\bar{1}$1), (10$\bar{1}$2), and (10$\bar{1}$0); α 1.593, β 1.593, γ 1.628, $Z = c$, +. It was probably derived from eudialyte through eucolite by hydration. E. F. H.

A new mode of occurrence of struvite. C. PALACHE. *Am. Mineral.* **8**, 72–3 (1923); cf. Purcell and Hickey, *C. A.* **16**, 1817.—A description of crystals of struvite which were found in canned shrimp. Qual. tests showed the presence of Mg, P, and NH_3. The crystal measured was elongated along a, twinned on the basal pinacoid. The forms observed were: b(010), c (001), p (120), S (101), S_1 (10$\bar{1}$), h (021), h_1 (02$\bar{1}$), t (121). E. F. H.

Tabular amygdaloid from Nova Scotia. T. L. WALKER AND A. L. PARSONS. *Univ. Toronto Studies, Geol. Series*, No. **14**, 5–13(1922).—On the south shore of the Bay of Fundy the basalt cliffs are penetrated by vertical tubes of amygdaloid from 1 to 4.5 in. in diameter and up to 6 ft. in length. As many as 25 of these tubes were observed within a radius of 4 ft. The microscope shows the rock to be made up of plagioclase, augite, amygdules with an outer rim of silica usually filled with radiating fibrous zeolite, and a general development of hematite which gives the red color to the basalt. Analysis by E. W. Todd gave SiO_2 49.10, Al_2O_3 13.68, Fe_2O_3 5.97, FeO 5.22, CaO 9.58, MgO 6.58, Na_2O 3.52, K_2O 0.58, H_2O 5.42, P_2O_5 0.16, TiO_2 0.62, sum 100.43%. Probably these tubes are caused by the escape of steam through the lava flow from the underlying rocks. **Zeolites of Nova Scotia.** *Ibid* 13–73.—In this paper the petrology of the basalts is discussed particularly as it is related to the zeolites. This is followed by a discussion of the zeolites, their geographic distribution and paragenesis, chem. compn., dehydration data with curves, and a comparison with other zeolitic regions. Chem. analyses by E. W. Todd of 59 specimens and extensive detns. of dehydration at temps. ranging from 35° to 930° are tabulated. The minerals studied include analcite, apophyllite, chabazite, diabantite, gmelinite, heulandite, laumontite, mesolite, mordenite, natrolite, okenite, scolecite, stilbite, and thomsonite. Optical and crystallographic characters are given in some cases. **Some Candian diopsides.** *Ibid* 74–9.—Specimens of diopside from (1) Macdonald Island, Baffin Land, (2) Storrington Township, Ont., and (3) Hull Township, Quebec, had sp. gr. of 3.13, 3.272, and 3.275, resp. The SiO_2, CaO and MgO of the 3 specimens were in close agreement. Al_2O_3 was 0.0, 0.48 and 2.24; Fe_2O_3 was 1.07, 0.16; and 0.94, FeO was 4.42, 0.85 and 2.28, resp. Each mineral showed cryst. forms which were measured and described. **Dumortierite from Ashby Township, Addington County, Ontario.** T. L. WALKER. *Ibid* 80–3.—The mineral occurs in a pegmatite vein, about 1 ft. wide which intersects the gneiss complex of the region. The principal minerals of the vein are microcline and quartz with kyanite and muscovite in smaller amts. In the muscovite the dumortierite occurs as slender prisms which lie in the cleavage plane of the mica while in the quartz and microcline the dumortierite forms stouter more complex cryst. aggregates. In thin sections the mineral is of deep Berlin blue color, the ns. being $\alpha = 1.659$, $\beta = 1.684$, $\gamma = 1.686$, all ± 0.003. Analysis by Todd gave SiO_2 30.46, Al_2O_3 60.80, Fe_2O_3 1.08, Ti_2O_3 0.08, MnO 0.11, MgO 0.77, B_2O_3 5.37, H_2O 1.32, sum 99.99%; sp. gr. 3.309. Formula $8Al_2O_3.B_2O_3.7SiO_2.H_2O$. **Copiapite from Liard Post, B. C.** T. L. WALKER. *Ibid* 84–6.—The mineral occurs as a finely divided cryst. powder, color sulfur to canary yellow, sp. gr. 2.087, $\beta = 1.538$, $\gamma = 1.578$. Analysis by Todd gave SO_3 37.92, Fe_2O_3 24.96, Al_2O_3 0.52, MgO 3.10, H_2O 31.51, insol. 1.96, sum 99.97%. When heated the mineral loses water at low temp. and then evolves SO_3. It is probable that all the water is evolved at 555° or a little above. When

heated to 730° the loss was 60.12%. **Fibroferrite from Quatsino, B. C.** T. L. WALKER. *Ibid* 87–8.—The specimen consists of myriads of very slender colorless crystals and tufts of slightly brownish cryst. bundles. Indices of refraction were α and β = 1.518, γ = 1.561, both ± 0.003, pleochroism Z-pale amber yellow, X and Y-colorless. Analysis by Todd gave Fe_2O_3 32.68, FeO 0.28, SO_3 32.48, H_2O 33.20, insol. 1.08, sum 99.72%; sp. gr. 1.901. There are 3 minerals having the same ratios for Fe_2O_3 and SO_3 but differ in contg. 7, 8, or 10H_2O per mol., resp. This specimen agrees with the formula Fe_2O_3.-$2SO_3.9H_2O$. Heated in the electric oven the mineral loses all of its water at a little above 500°, then SO_3. At 950° the total loss is 65.4%. **A third type of proustite from Cobalt, Ontario.** A. L. PARSONS. *Ibid* 89–90.—A twin crystal of proustite showed the entire suppression of the form e(01$\bar{1}$2) from one individual of the twin, while it is present with 3 well developed faces on the other, suggesting hemimorphic development. The crystal was twinned with r(10$\bar{1}$1) as the twinning plane. Trigonal and ditrigonal prisms were present on alternate edges of the hexagonal prism. **Occurrence of tellurides in Ontario.** E. THOMSON. *Ibid* 91–8.—Altaite PbTe, coloradoite HgTe, petzite $(Ag, Au)_3Te$, hessite Ag_2Te, tetradymite Bi_2Te_3, nagyagite $Au_2Pb_{14}Sb_8Te_8S_{17}$, calaverite $(Au, Ag)Te_2$ and kalgoorlite $HgAu_2Ag_6Te_4$ have been found in Ont. The deposits and mines in western and northern Ont. and those of the Kirkland Lake region are described. L. W. RIGGS

The chemical tetrahedron in petrography. E. S. FEDOROV. *Bull. acad. sci. Russie* **1918**, 631–44.—A description of methods of graphical presentation of the chem. nature of silicate minerals. The latter consist of combinations of oxides of uni-, bi-, ter- and quadri-valent elements; their mol. compn. can be defined by points in tetrahedral space, where the corners of the tetrahedron represent atoms of (Na, K, Li), (Ca, Mg, Fe, Mn), (Al, Fe) and (Si, Ti, Zr). Most of the common silicates become represented by points upon the faces (Na)(Al)(Si) and (Ca)(Al)(Si), while such minerals as oligoclase and labradorite are given by points 3 1 5 11 and 1 1 3 5, located inside of the tetrahedron upon a line connecting albite (1 0 1 3) with anorthite (0 1 2 2), which both represent the end members of the series. Points corresponding to different mineral compns. are found by the method of the graphical or algebraic detn. of centers of gravity. With the help of determinants, symbols of planes presenting various types of silicates may be obtained in the form of $[ABCD]$, while lines connecting 2 certain points (a, b, c, d) and (a^1, b^1, c^1, d^1) are defined by the symbol $(ma + na^1, mb + nb^1, mc + nc^1, md + nd^1)$ (where m and n can be chosen at will), and represent particular series. If m is taken equal to 1, n must be changed to $n/m = p$. To find the special compn. belonging to a certain series $(a + pa^1, b + pb^1, c + pc^1, d + pd^1)$ and presenting a type of the symbol $[ABCD]$, an equation of the form: $A(a + pa^1) + B(b + pb^1) + C(c + pc^1) + D(d + pd^1) = 0$, must be satisfied by making: $p = -(Aa + Bb + Cc + Dd)/(Aa' + Bb' + Cc' + Dd')$. In this manner a metasilicate [1232] can be found among the plagioclases, represented by albite (1013) and anorthite (0122), by making $p = -(1 \times 1 + 2 \times 0 + 3 \times 1 - 2 \times 3)/(1 \times 0 + 2 \times 1 + 3 \times 2 - 2 \times 2) = 1/2$, which relation defines the point $(2 \times 1 + 0, 2 \times 0 + 1, 2 \times 1 + 2, 2 \times 3 + 2)$ or (2 1 4 8) representing the mineral andesine, $Na_2CaAl_4Si_8O_{32}$. While the visuality of the regular tetrahedron presentation is of great value for educational purposes, it is difficult to handle by the graphical method and algebraic computations. Therefore F. proposes 3 improved ways for this kind of study, as follows: (*A*) The edge between (0010) and (0001) (Al and Si) forms the axis of regular image projections. Ratios (Ca)/(Si + Al) and (Na)/(Si + Al) are plotted in the horizontal and vertical plane, resp. Typical planes and serial lines are found by the general methods of descriptive geometry. (*B*) Same, but the ratios (Na)/(Si + Al) are presented by diameters of vectorial circles with centers in the points defined by (Ca) (Al) (Si). These circles may bear additional figures giving the ratios K/Na, Mg + Fe/Ca, Al/Fe. (*C*) Only one projection is used. The numbers (a, b, c, d) are computed so as to have $a + b + c + d = 120$ (this latter being provisory). The a's are plotted as abscissas, b's as ordinates, c's as diams. of vectorial circles and d's form the balance to 120. Any lines in the drawing with their contangential series of circles, having a common crossing point for the axis and the tangents (the linear second of circles) present some typical plane of the tetrahedron, while each line with a series of circles, having common tangents (a linear prime of circles), represents a serial line. For instance any linear second, including the line running from the point 80 upon the axis of ordinates to 96 upon the abscissa, will represent together with the total of possible circles (linear second) the plane of orthosilicates, while a tangent starting at abscissa 120 and touching the circle (1011) (muscovite), (4033) (sodalite), (5033) (nosean), represents a special series (products of muscovite hydrolysis with the removal of kaolin). F. concludes with a graphical

analysis of the olivine, nepheline and intermediate *laurdalites* from the vicinity of Christtiania, as described by Brögger. M. G. KORSUNSKY

The chlorite group in relation to its chemical composition. E. S. FEDOROV. *Bull. acad. sci. Russie* **1918**, 645–50.—The chem. compn. of the chlorite group, which was formerly considered as a linear series, of varying mixts. of amesite ($H_4(Mg, Fe)_2Al_2SiO_9$) with serpentine ($H_4(Mg, Fe)_3Si_2O_9$) is really more complex, and with the use of the chem. tetrahedron (preceding abstr.) F. allocates to this group the plane defined by the symbol [6456]. The monovalent corner of the tetrahedron is in this case occupied almost exclusively by H. Nine minerals of the chlorite group fit extraordinarily well in this plane, while 3 others show discrepancies, probably due to the inexact analysis. A diagrammatic projection of the typical plane upon the horizontal plane is given, where the monovalent part of the compd. is identified by vectorial circles. The minerals amesite (4221), rumpfite (6142) and serpentine (4302) form the summits of the triangle, which includes all the 9 minerals: amesite, chinochlore, delessite, corundophilite, rumpfite (bas.) rumpfite (var.) prochlorite, thuringite, and penninite. M. G. KORSUNSKY

Progress in the science of meteorites. H. MICHEL. *Fortschr. Mineral. Krist. Petr.* **7**, 245–326(1922).—This paper comprises: a bibliography of 223 entries, mainly of papers published from 1914 to 1920; a list of new meteorites; a discussion of the geographical distribution of falls; a discussion of the chem. distribution of meteorites; 111 analyses of meteorites; 16 analyses of minerals from meteorites; a table giving the av. compn. of various groups of the Fe-Ni meteorites; spectroscopic investigations; radioactivity of meteorites; mineralogical observations; the classification of meteorites; and a summary of the situation as to tektites. E. F. H.

A meteoric metabolite from Dungannon, Virginia. G. P. MERRILL. *Proc. U. S. Nat. Museum* **62**, No. 18, 2 pp.(1923).—The specimen was found while plowing at "Copper Ridge" about 3 mi. southeast of Dungannon, Scott Co., Va. Its wt. = 13 kg.; cleavage octahedral; it is soft, malleable, and contains no nodules of troilite or schreibersite. The polished and etched surface is unlike any iron thus far examd. The kamacite bands are broad, short and somewhat wavy, while taenite is less conspicuous. Notable features are fine granulation and the presence within the kamacite bands of areas of dull black which inclose minute rounded bits of material consisting of Fe and amorphous C. Analysis by Whitfield gave: sol. in boiling (dil. 1:1) HCl 98.92, insol. 1.08. The sol. portion gave: Si 0.0115, P 0.13, Ni 7.069, Co 0.09, Fe 92.69, sum 99.994%. The insol. portion yielded P 11.564, Ni and Co 38.89, Fe 49.00, C 0.542. S, Cr and Cu were absent. The C appears to be in the free state. L. W. RIGGS

An Oklahoma meteorite. A. C. SHEAD. *Proc. Okla. Acad. Sci., Bull.* **1922**, (No. 247)79.—A meteorite weighing about 16 lbs. was found in Sec. 1, T. 1S., R.26 E. It was irregular in outline, jagged, hard, magnetic and distinctly malleable. Chem. analysis gave: free Fe 91.60, free Ni 7.23, P 0.234, Cl 0.22, traces of Si, C, and Co, sum 99.285%. L. W. RIGGS

The meteorite of Grimma, Saxony. F. HEIDE. *Centr. Mineral. Geol.* **1923**, 69–78.—This consists of: nickel-iron (sp. gr. 7.688) with Fe 90.19, Ni 8.21, Co 0.69, P 0.18, residue 0.30%; bronzite (formerly supposed to be olivine) (H. = 6, sp. gr. = 3.314) with SiO_2 56.26, Al_2O_3 1.01, *FeO* 12.85, *MnO* 0.59, *MgO* 27.46, *CaO* 1.01%; tridymite (H. = 6.5, sp. gr. = 2.267); troilite in small amt.; schreibersite and chromite (?) in very minute amts. The meteorite belongs to the group of siderophyres. The general agreement, structurally and mineralogically as well as in the phys. and chem. properties of the components (as shown by tables), makes it clear that the meteorite of Grimma belongs to the same fall as those of Rittersgrün, Saxony and Breitenbach, Bohemia. J. E. GILL

The potash field in western Texas. G. R. MANSFIELD. *Ind. Eng. Chem.* **15**, 494–7(1923).—Potash deposits, probably of commercial quality and thickness, and at minable depth, have been found in the Panhandle district. Logs of several wells, with K_2O detns., are included. E. F. H.

How oil accumulates. D. MILSOM. *Queensland Govt. Mining J.* **24**, 49–50(1923).—M. discusses the influence of capillarity, the formation of oil-bearing structures, and the relationship of seepages and structure. A. BUTTS

The quantitative mineralogical and chemical constitution of the luciite of Luciberg, Odenwald. MARIE POSNOWA. *Centr. Min. Geol.* **1923**, 129–33.—By Rosiwal's method, with a Hirschwald ocular (×75), the vol. % of the constituent minerals (plagioclase, hornblende, quartz, biotite, ilmenite, and pyrite) was estd. from 3 thin sections cut at right angles to one another. From this av., av. values being used for the sp. gr. of the min-

erals, the weight-% was calculated. Av. compns. of minerals present as calcd. by Chervinskii were used as a basis for distribution of this analysis among the various oxides, giving: SiO_2 50.84, TiO_2 2.00, Al_2O_3 19.58, Cr_2O_3 0.01, Fe_2O_3 3.04, FeO 4.98, MnO 0.06, CaO 8.78, MgO 4.71, BaO trace, K_2O 1.26, Na_2O 3.39, F. 0.02, H_2O 1.21%. The mineral compn. calcd. was: plagioclase 57.61, hornblende 28.55, biotite 5.58, quartz 4.03, ilmenite 4.11, pyrite 0.12%. Chem. analyses of similar rocks check very closely with these detns. J. E. GILL

Quantity of helium and other gases in Japanese natural gases. I. NOBUO YAMADA. *J. Chem. Soc. Japan* **43**, 884-97(1922).—The He contents of 13 typical Japanese natural gases were estd. by the Cady-McFarland method. Only 5 contained He, the max. being 0.2%, and the rest contg. 0.002-0.007%. Since "Yamagata" gas contained a comparatively high % of He, 10 different natural gases of that province were further analyzed for CO_2, heavy hydrocarbon, O_2, methane, N and other gases He, and radioactivity. Six of these contain methane as the main constituent. Two contain methane with petroleum gas mixed with CO_2 and N, and the last 2 are made of almost pure N and gases of the A group. The first 6 contain no He, the next 2 contain 0.0094 and 0.003%, the last two 0.202, and 0.037%. The He content is proportional to the N content (cf. Cady), but not to the radioactivity of the natural gas. S. T.

Weathering. R. LANG. *Fortsch. Mineral. Krist. Petr.* **7**, 175-244(1922).—Weathering by phys. and by chem. processes, the weathering agents, the products, and the influence of climate on weathering are fully treated. A bibliography of 71 papers is given. E. F. H.

The history of mineralogy in ancient times and the middle ages. KARL MIELEITNER. *Fortsch. Mineral. Krist. Petr.* **7**, 427-80(1922). E. F. H.

Iron-molding sands in Ohio (BOWNOCKER) **9.** Geology and producing conditions of the Kevin-Sunburst oil field (CLARK) **22.** Petroleum of Montechino-Velleia (FENOGLIO) **22.**

NECHAEV, A.: **Mineralogy.** Textbook for High Schools (in Russian). 3rd Ed. Moscow: Gosisdat. 338 pp.

9—METALLURGY AND METALLOGRAPHY

D. J. DEMOREST, R. S. WILLIAMS

Symposium on metallurgical education. S. L. GOODALE, *et al.* *Trans. Am. Soc. Steel Treating* **3**, 534-68(1923). W. A. MUDGE

Concentrating practice of the Broken Hill South Limited, Broken Hill, South Wales, Australia. W. E. WAINRIGHT AND T. A. READ. *Proc. Australasian Inst. Mining Met.* **1921**, No. 44, 225-93.—A detailed description of the concn. of galena ores at this plant. R. S. DEAN

Investigations on the copper-nickel ores of the Rustenburg district. J. A. ORTLEPP. *J. Chem. Met. Mining Soc. S. Africa* **23**, 23-31(1922).—The minerals in the ores were identified microscopically as pyrrhotite, pentlandite, chalcopyrite, and gang minerals of the pyroxene group. The analysis was SiO_2 24.56%, S 26.96%, Fe, 39.48%, Ni 3.71%, Cu 4.8%, MgO 1.05%. Gravity, magnetic and flotation concn. were unsuccessful. Expts. with mat smelting gave the most promising results. R. S. DEAN

Reduction of iron ores by carbon monoxide. A. STANSFIELD AND D. R. HARRISON. *Trans. Roy. Soc. Canada* **16**, Sect. V, 175-9(1922).—Plotting reduction against time, when the crushed ores are heated to temps. between 700° and 950° in a stream of CO, shows peculiar stepped curves indicating the different stages of reduction. A. T. CAMERON

Blast-furnace gases. Relation between the composition of the gases passing up the furnace and the reaction taking place at the various points of the furnace. J. SEIGLE. *Rev. métal.* **20**, 195-205(1923); cf. *C. A.* **16**, 3622.—A mathematical discussion. A. P.-C.

Obtaining large blast-furnace production. D. T. CROXTON. *Iron Age* **111**, 897-900(1923).—Owing to the use of steel scrap and turnings in the blast furnace for the making of pig iron, some controversy has arisen in regard to the pig iron production, the fuel used and the iron production. To make some detn. of this fact, the Trumbull-Cliffs Furnace was operated over periods of several weeks, under ordinary conditions,

use of varying amts. of scrap and also with the use of certain % of hard ore in the burden. The original production of the furnace was 604 tons pig per day. By the use of steel scrap this was increased to 626 tons, though no increase in air could be used without causing the smelting zone to rise. To remedy the heating conditions a certain amt. of hard ore was introduced into the charge, with the result that the tonnage was very much increased. For the best driving of the furnace the burden should consist of scrap, soft ore and hard ore in percentages as detd. In this way the production was increased to as much as 900 tons per day in one case. The results obtained are tabulated and curves plotted to indicate the variations taking place and results obtained.
W. A. MUELLER

Cleaning the spouts of Bessemer converters by means of an electric arc. LEBRUN. *Rev. métal.* **20**, 193–4(1923). A. P.-C.

A new construction of foundry reverberatory furnace. OSANN. *Giesserei Z.* **10**, 69–71(1923).—An illustrated description of a reverberatory furnace modelled on the Batho Martin furnace (cf. Osann, *Lehrbuch der Eisenhüttenkunde* **II**, 344). The large area and relatively small charge of the Batho furnace are overcome and gas, lignite briquets or coal may be used as fuel. C. C. DAVIS

Modern methods for making cupola mixtures. H. L. CAMPBELL. *Chem. Met. Eng.* **28**, 492–5(1923).—Diagrams are used in detg. the amts. of pig iron and scrap for obtaining castings of any desired chem. compn. Si and Mn may be diagrammatically detd. if 3 piles of pig iron are in use. C. H. HERTY, JR.

Iron-molding sands in Ohio. J. A. BOWNOCKER. *Ohio J. Sci.* **23**, 25–40(1923). E. H.

Chemistry in relation to tinplate manufacture. H. J. BAILEY. *Chemistry & Ind.* **42**, 362–5(1923).—Annealing, pickling and tinning are discussed. E. H.

The scientific foundation for the study of the noble metals. R. VOGEL. *Z. angew. Chem.* **35**, 705–8(1922).—An elementary exposition of the principles of metallography. F. P. FLAGG

The structure of eutectics. ALBERT PORTEVIN. *J. Inst. Metals* (advance proof) **1923**, 30 pp.; *Engineering* **115**, 447–80, 505–7.—The microscopical structures of a considerable number of binary eutectic alloys were examd. and an attempt was made to give a methodical classification from the data thus obtained. Photomicrographs are included. V. O. HOMERBERG

The nature of solid solutions. E. C. BAIN. *Chem. Met. Eng.* **28**, 21–4(1923).—In a solid soln. some of the atoms of one element are substituted on the space lattice of the other with a resulting distortion of the lattice. This distortion is greater, the larger the difference between the lattice dimensions of each element; it does not vary in proportion to the percentage of added element. The distortion is less than would be expected. This indicates a weak attraction between unlike atoms. The space lattices of the following solid solns. are discussed: Cu-Zn, Cu-Sn, Cu-Al, Cu-Mn, Ag-Cd, Ag-Zn, Fe-Cr, W-Fe, Mo-Fe, Fe-Mn, Cu-Ni, Cu-Au, Au-Ag, Mo-W.
F. P. FLAGG

System tin-arsenic. Q. A. MANSURI. *J. Chem. Soc.* **123**, 214–23(1923).—A complete study has been made of the system Sn-As from pure Sn to practically pure As, the diagram obtained being the first complete one of an As system. In the prepn. of the alloys very pure Sn and doubly sublimed As were used. While the 2 metals alloy in all proportions, they form but 2 compds., Sn_3As_2 and SnAs, as proved by 2 distinct max. in the thermal equil. curve, by chem. analysis, and by photomicrographs. The m. p. of As lies between 800° and 850°, but molten As can be supercooled considerably. The m. p. of Sn is not appreciably lowered by the addition of As. At the concn. of 29.5% As the alloy freezes at a single temp. and is the compd. α itself. The rest of the system up to an alloy contg. about 39% As is of the usual eutectiferous type. At that compn. the compd. SnAs is formed. This compd. forms a partly eutectiferous system with As with the formation of the solid solns., γ and δ, at both ends respectively. It is these solid solns. that have As vapor present as one of their constituents. All alloys contg. these solid solns. give a thermal arrest at 472°. Alloys of Sn with As are very similar to those of Sn with P in most of their properties and in their crystal structure. The thermal curve of the Sn-As system is very similar to that of the Sn-P system. H. JERMAIN CREIGHTON

X-ray examination of inner structure of strained metals. II. Copper under various kinds of deformation. AKIMASA ONO. *Mem. Coll. Eng. Kyushu Imp. Univ.* **2**, 261–75(1922); cf. *C. A.* **17**, 1409.—The X-ray examn. of drawn wires and tubes, and of Cu specimens strained by extension, compression, and torsion, was performed, and the pattern of the interference figure obtained in each case was explained. The Cu

wire examd. with monochromatic ray showed that the inference made in the first report with regard to the lattice rearrangement is very probable. The pattern obtained from the Cu tube was not identical with that of the hard-drawn wire, and it appeared like a wire in the early stage of drawing. In the case of extension, the lattice planes as analyzed in the case of hard-drawn Cu wires were all clearly observed, while in the case of compression and torsion the pattern showed chiefly the rearrangement of a certain particular plane as in the wire after a moderate degree of drawing. The essential feature of the flow of Cu under various kinds of deformation was to some extent revealed and the similar and the dissimilar points were brought to light. V. O. HOMERBERG

Inner structure of the crystal-grain as revealed by meteorites and Widmanstätten figures. N. T. BELAIEV. *J. Inst. Metals*, Advance proof, 25 pp.(1923).—Various octahedral sections are described, and their relation to the Widmanstätten figures is emphasized. A method is described for the detn. of the position of a secant plane (ω, ϕ) in space, with reference to the angles A, B, C, and D, between the 4 sets of lines of the Widmanstätten figures. The application of that method to the case of an alloy with the well developed Widmanstätten structure is shown, and a diagram of a section with about 20 grains variously oriented given. The importance of that method for the crystallography of metals is emphasized, and the suggestion brought forward that the occurrence of Widmanstätten figures in metals crystallizing in the regular system is associated with the face-centered cubic lattice V. O. HOMERBERG

Crystal growth in cadmium. MAURICE COOK. *J. Inst. Metals; Trans. Faraday Soc.* (advance proof) **1923.**—Results indicate that in annealing considerable crystal growth has taken place in unworked specimens of Cd. V. O. HOMERBERG

Grain growth of unworked iron and the striated structure appearing after heating above 1100°. KARL DAEVES. *Z. anorg. allgem. Chem.* **125,** 167–72(1922).—A normal steel casting (0.08% C and 0.35% Mn) was heated at one end to 1230° while the other end remained cool. The temp. was held const. for 50 min. and the temp. drop from cm. to cm. measured within the rod by means of a thermoelement. The rod was then cooled in air. Inspection up to the point 1060° showed nothing unusual. From this point on, however, a definite structure was apparent in isolated spots. From 1115° to 1420° the entire section showed this structure. Further expts. with small pieces heated to various temps. in this neighborhood and quenched in various ways indicate that this new structure appears in C-poor iron heated at about 1125°. With rapid cooling pearlite is not separated or at least only incompletely. With slow cooling the structure can be changed into normal but rather coarse grain. This structure is connected with a notable grain coarseness and causes poor quality. It can be removed by annealing at 900°. L. T. FAIRHALL

Volume changes accompanying solution, chemical combination, and crystallization in amalgams. A. W. GRAY. *J. Inst. Metals* (advance proof) **1923,** 44 pp.; cf. *C. A.* **16,** 4117.—A general hypothesis of reaction expansions, the factors that influence dimensional changes and exptl. data illustrating the hypothesis are discussed. V. O. H.

Oxidation of metals at high temperatures. N. B. PILLING AND R. E. BEDWORTH. *J. Inst. Metals* (advance proof) **1923,** 54 pp.; cf. *C. A.* **16,** 3457.—Metals are classified as noble or base, depending on the dissoc. pressure of the oxide which tends to form; in the noble metals this is so large that oxidation can occur only under very great O pressures, and under ordinary conditions does not happen. The base metals may be further divided into 2 groups, based on the texture of the oxide produced and depending upon a certain relation between the densities of the metal and the oxide. This oxide texture dets. whether or not the oxide coating formed serves to lessen further oxidation. In the non-protective group are found the majority of the light, low-melting metals. The oxidation of Cu, which is a typical member of the group, which forms protective coatings, has been studied in considerable detail. The controlling factor in the mechanism of low-temp. oxidation is the soln. and diffusion of O in the oxide, and the protective action of the latter is conditioned upon the necessity of O penetrating the oxide layer by this means alone, before reaching the free metal surface. When this is rigorously true, the amt. of oxidation is proportional to the sq. root of the time, and the variation of the oxidation rate with temp. follows a parabolic curve involving proportionality to a high but const. power of the abs. temp. These conclusions have been satisfactorily confirmed by exptl. work with Ni and Fe in different degrees of purity, and with Zn, Pb, Al, and Cd. The 2 latter metals have an interesting additional property of apparently stopping oxidation completely after a thin oxide layer has been built up slowly, over a period of several days, at temps. not far from their m. ps. It appears that while the heavy base metals differ most remarkably among themselves in regard to resistance to high-temp. oxidation, the causes of these differences are con-

cerned not with any properties of the metals themselves, but with certain obscure and imperfectly known physical properties of the oxides produced. V. O. HOMERBERG

Hydrogen-sickness of copper. A. BAUER AND VOLLENBRUCK. *Mitt. Material-prüfungsamt.* **40,** 151–6; *Z. Metallkunde* **14,** 296–9(1922).—At red heat H diffuses readily in Cu. It reduces any Cu_2O inclusions and forms Cu and steam. The steam is now confined at high temp. and great pressure and splits open the copper. The walls of the crack are quickly oxidized by the air and filled with Cu_2O. Expts. were carried out with copper bars which substantiate this theory. Cu contg. Cu_2O should be heated in an atm. entirely free from hydrogen. F. W. COBB

Further studies in season-cracking and its prevention. The removal of internal stress in 60:40 brass. S. BECKINSALE. *J. Inst. Metals* (advance proof) **1923,** 12 pp.—Methods of removal of internal stress in 60:40 brass have been investigated by measurement of reduction of internal stress by specified treatments and by observing the behavior of the treated articles in $HgNO_3$ soln. Low-temp. annealing is superior to other methods for the removal of internal stress in finished articles of 60:40 brass, but reeling of rods or tubes has advantages when it is necessary to straighten these as well as to reduce the amt. of stress in them while maintaining the max. degree of hardness. Internal stress in 60:40 brass is removed within a much lower temp. range in either the 70:30 or 70:29:1 brasses. The generalizations regarding the amt. of remaining stress which were found to hold for 70:30 and 70:29:1 brass also apply to the 60:40 brass examd. The softening effect of the heat treatment is marked at much lower temps. than in 70:30 brass. A slight but definite lowering of hardness, max. load, and yield point occurs in 60:40 brass with a Brinell hardness of 160 (ball 2 mm. diam. and a load of 40 kg.) after treatment at 175° for 1 hr. With higher initial hardness slight softening occurs at lower temps. Heat treatment at 175° to 200° for 20 to 30 min. will reduce internal stress to a safe amt., while such a treatment will have only a slight effect on the mechanical properties of any but the most severely cold-worked specimens of 60:40 brass. V. O. HOMERBERG

Thermal transformations in some chrome-vanadium steels. J. S. VANICK AND W. W. SVESHNIKOFF. *Trans. Am. Soc. Steel Treating* **3,** 502–33(1923).—A study of the movement with changes in compn., initial temp. and rate of cooling of the thermal transformations in a series of Cr-V steels was made and correlated with differences in hardness and microstructure to indicate possible changes in constitution. Cr-V steel contg. 0.30–0.40% C, 1.0% Cr, and 0.18% V was used as a standard; one of the important elements was varied while the other two were kept const. C varied from 0.16 to 1.16%, V from 0.0 to 0.65%, and Cr from 0.0 to 21.0%. The influence of the 0.30–0.40% C range and the effect of common impurities such as Mn and Si were shown by three additional steels. (1) An increase in C lowers the positions of the transformations which remain, however, 10–30° above those for the corresponding alloy-free steels. Ac_1 occurs above Ac_1 in the low-C steels. Ar is lowered only 12° by increasing the initial temp. from 850° to 975°, indicating that the soln. of the elements is practically complete at 850°. (2) An increase in V from 0.20 to 0.65% produced a small displacement of the transformations. A-1 is raised approx. 5° for each 0.10% V; A-3 is obscured in the thermal curves but revealed in the hardness curves. Thermal and hardness data indicate that the soln. of V or its compounds is accomplished between 850° and 900°. Cooling from 900° to 975° does not displace the Ar transformations. (3) An increase in Cr from 0 to 21.0% causes a gradual rise in Ac_1, effecting a junction with Ac_2 at 0.75% Cr, and with Ac_3 at 3.1% Cr; the rise continues to 7.7% Cr and then remains const. Ac_2 is const. up to 7.7% Cr and then falls. Cr enters the carbides up to 7.7% after which the excess Cr passes into the ferrite. (4) The split transformation appears feebly at 2.0% Cr and strongly at 7.0% Cr for the cooling rates used. Increasing the rate of cooling or initial temp. suppresses or lowers transformations. The effects of cooling from fixed temps. at increasing rates are due to the retarding action of Cr in soln., while the effects produced by cooling from higher initial temps. are attributed to the dissociation of carbides and the distribution of their components in the steel. The structures accompanying the various thermal changes indicate that the combined Ar_{3-1} transformation occurs in segments when Ar′ and Ar″ appear as distinct inflections. Complete data are given in tables, curves and photomicrographs. A bibliography is attached. W. A. MUDGE

Secondary structures in steel. N. T. BELAIEV. *Chem. Met. Eng.* **28,** 537–40 (1923).—Steel solidifies in dendrites of δFe. The transformation into γFe involves recrystn. into independent granules of austenite. The further change into αFe causes 3 varieties of secondary structure. V. O. HOMERBERG

Changes in iron and steel at temperatures below 280°. F. C. THOMPSON. *Proc.*

Roy. Soc. (London) **102A,** 587–99(1923).—Fe shows abnormalities of the rates of increase of elec. resistance and elec. potential against Pt at well marked temps. Below 280° these temps. are: 55°, 100°, 120°, 140°, 220° and 245°. Those at 120° and 220° are the most important. It is difficult to believe that these can be of the nature of allotropic changes: At present the explanation is unknown. Under the same conditions carbide of Fe possesses 2 well marked points at 160° and 200°. It is not clear whether these are distinct points or are the ends of a single transformation range. When samples of Fe and high-C steel are quenched from 280°, the elec. resistivities differ from those obtained by slow cooling. These values are not const., but as the material tempers they gradually alter till after the lapse of some days they practically coincide with those obtained by slow cooling. V. O. HOMERBERG

Deterioration of malleable iron in the hot-dip galvanizing process. W. R. BEAN. *Trans. Am. Inst. Mining Met. Eng.* **1923,** No. 1214-s, 28 pp.—The embrittlement of malleable iron following galvanizing is associated with high P and Si contents and rapid cooling after being coated with Zn. The fracture of the brittle metal is white and intergranular. As the Si content increases, the amt. of P that may be present without causing embrittlement, decreases. The embrittlement may be prevented by controlling the P and Si contents and by quenching the galvanized pieces in heated baths. F. P. FLAGG

New process for protecting iron and metal constructions against rusting. B. ZSCHOKKE. *Rev. métal.* **20,** 165–74(1923).—From a large number of expts. which are not described in the article Z. concludes: (1) Aq. solns. of CrO_3 salts, having at least a given min. concn., preserve Fe and steel from rust for an unlimited period of time without any decrease in the activity of the soln.; (2) the "passivity" imparted to the metal lasts only while the latter is immersed in the soln.; (3) the limiting concn. (at which it begins to act) of a passivifying soln. is not a const. quantity, the action of the soln. depending to a considerable extent on the ratio between the amt. of soln. and the surface of metal immersed; (4) passivifying solns. are active at temps. as high as 100°; (5) addition of certain compds., *e. g.*, chlorides and sulfates of alkalies and alk. earths, reduce, inhibit, or even reverse the passivifying effects of CrO_3 solns., and others, *e. g.*, alk. carbonates and $Ca(OH)_2$, increase their activity; (6) CrO_3 solns. act on other metals (Cu, Sn, bronze, brass, etc.), whether alone or in intimate contact with Fe; (7) their action extends a certain distance to parts of the metal not actually immersed. Practical applications of these principles are given. A. PAPINEAU-COUTURE

Determination of the critical temperature for annealing gray cast iron. E. SCHÜZ. *Stahl u. Eisen* **42,** 1484–8(1922).—In pearlitic gray cast iron, the phosphide eutectic, unless segregated, has no practical influence on the hardness. The influence of graphite on the hardness has also been exaggerated, the size of the graphite flakes having very little effect. On annealing thick gray iron castings the sepn. of ferrite is frequently propagated from the edges to the center. In expts. made to det. the temp. at which pearlitic gray iron is decomposed into ferrite and temper C, the crit. range was found to be lower than is usually accepted. With an annealing period of 24 hrs. the decompn. of the carbide commences at 500° and is complete at 600°; for a 6 hr. anneal the action commences at 550° and is complete at 650°; while with an annealing period of 3 hrs. the decompn. begins at 575° and is complete at 650°. The bearing of the results on the iron-C diagram is considered. J. S. C. I.

Soft annealing of gray cast iron. E. PIWOWARSKY. *Stahl u. Eisen* **42,** 1481–3 (1922).—A no. of annealing expts. were carried out at various temps. and for different periods of time on a pearlitic gray iron (C 3.18, graphite 2.49, Si 2.95, S 0.068, P 0.102, Mn 0.63%) and on this material alloyed with 1% of Ni and 20% of steel, resp. Annealing below Ar_1 did not produce decompn. of the pearlite in the case of the iron alloyed with 20% of steel and the rate of decompn. for the other two materials was not sufficent for practical purposes. In the temp. interval between Ar_1 and Ac_1 the softening is at a rate sufficiently high for practical purposes if the Si content is high enough. Quick heating to a little above the Ac_1 point with a final cooling through the Ar_1 interval at a rate less than 1° to 2° per min. is the surest means of obtaining quick annealing. J. S. C. I.

Liquation phenomena in metal alloys. O. BAUER AND H. ARNDT. *Brass World* **19,** 103–7(1923).—A translation (cf. *C. A.* **16,** 3859). C. G. F.

Calite, a new alloy resistant to high temperatures. J. GAILLARD. *Usine* June 17, 1922; *Rev. universelle mines* **16,** 317–8(1923).—Calite is an Al-Ni-Fe alloy made in a basic Heroult elec. furnace by fusing and decarbonizing scrap steel, removing the dross, adding Ni, reducing the melt and adding approx. 25% of scrap calite by wt. to the charge. When homogeneous, the metal is run into a previously heated receptacle contg. the

requisite amt. of Al, and from this to the molds. It is hard, and either hot or cold is highly resistant to shock. It is not oxidized below 1300°, can be used indefinitely at 1200°, is easily sol. in 25% H_2SO_4, in insol. in HNO_3, is very slowly dissolved by HCl, is not attacked by fused carbonates, chlorides, nitrates, cyanides, Pb, Zn, Sn, S and S vapor, but is attacked by cryolites, borates and silicates. It melts 1525°, softens at 1370°, can be worked at 1200–1300°, has d. 7.07, Brinell hardness after annealing 286, hardness by the scleroscope after annealing 40, thermal cond. 25% that of Fe, tensile strength 25.8 kg. per mm.^{2}. The % compn. is not given. C. C. DAVIS

Uranium alloys [with nickel, iron, and aluminium]. P. A. HELLER. *Metall u. Erz* **19,** 397–9(1922).—Alloys of U with Ni or iron may be produced on a comparatively large scale by fusing suitable mixts. of U oxide (U_3O_8) and Ni oxide with the requisite amt. of C in a C crucible by means of an arc. The oxide-C mixt. is first briquetted by means of tar and the briquets are heated in a wind furnace to drive off volatile matter before reducing in the arc furnace. Alloys of U with Ni contg. 67–70% U and 4.5–5.0% C and with iron contg. 45% U and 6.5% C have been prepd. by this method. Attempts to reduce the C content of the Ni alloys by fusing them in a magnesia-lined furnace and adding Ni oxide resulted in the production of an alloy contg. less than 1% C but only 26% U, the remainder of the latter having been slagged by the magnesia. The production of Al-U alloys by the thermite method gives a very poor yield, but satisfactory results may be obtained by reducing a mixt. of uranyl fluoride and UF_4 (formed by adding U_3O_8 to HF) by means of metallic Ca in the presence of Al, the operation being conducted in an iron bomb. By this method an alloy contg. U 62.8, Al 34.8, Ca 1.4, C 0.5, and Si 0.25% was obtained. J. S. C. I.

Preparation and properties of pure iron alloys. W. L. CHENEY. Bur. Standards, *Sci. Papers* **463,** 609–35(1922); cf. *C. A.* **15,** 2267.—The magnetic properties of a series of pure Fe-C alloys contg. 0–1.6% C were studied after the alloys had been hardened by quenching followed by tempering at 100–700°; and after the alloys had been annealed. The induction in alloys quenched and tempered at successively higher temp. rapidly rises between 200° and 250°, reaching a definite max. and then gradually decreases. Marked changes in the coercive force may be considered as indicative of the hardness of the material. The greatest decrease in the coercive force is between 200° and 300° and a cusp at 470° indicates a structural change at this temp. The max. intensity of magnetization calcd. from the reluctivity relationship in some cases had a single value; in others a double value. Examn. of specimens under the microscope revealed in some cases, that the number of values of I max. represent the number of constituents present. For annealed specimens magnetization curves show a decided change in the steepness of the curve in the second stage with change in the percentage of C; the coercive force has a max. for the highest C used; micrographs confirmed the number of constituents that might be predicted from the number of values of I max. in all cases except the 1.55% C. The expts. indicate the sensitiveness of magnetic quantities to slight metallographic structural changes resulting from heat treatment. F. P. FLAGG

Some properties of the copper-rich aluminium-copper alloys. R. C. READER. *J. Inst. Metals* (advance proof) **1923,** 18 pp.; *Engineering* **115,** 344–7.—The general outline of the exptl. work undertaken includes a consideration of the density, the vol. changes during and after solidification, self-annealing properties, and the effect of heat-treatment on the alloy contg. 10% Al. V. O. HOMERBERG

Influence of iron on copper and copper alloys. F. JOHNSON. *Engineer* **134,** 412 (1922).—Cu can hold up to 3% Fe in soln. Fe up to 0.5% deoxidizes, toughens and strengthens Cu. Fe content of α brass should be below 0.1% for most purposes. As much as 1% Fe in $\alpha + \beta$ brass is desirable. As much as 4% Fe in Al bronze is beneficial. In most Cu alloys examd. the limit of solid soly. of Fe was about 1%. The beneficial effects of Fe usually cease when free crystallites appear. D. B. DILL

Dilatometric study of the alloys of aluminium with magnesium and silicon. A. PORTEVIN AND P. CHEVENARD. *Compt. rend.* **176,** 296–8(1923).—Differential curves of the expansion of alloys of Al with Mg and Si against pure Al show a contraction at about 350° due to the gradual soln. of Mg_2Si. On cooling, the alloys expand progressively as the result of the pptn. of Mg_2Si. This pptn. is not complete and causes a residual contraction which increases with the max. temp. to which the specimen is heated. The change in length at room temp. of a quenched specimen was measured in a very sensitive dilatometer. The curve has the same shape as that showing the change in hardness over the same time intervals. F. P. FLAGG

Production and heat-treatment of chill-castings in an aluminium alloy ("Y."). W. ROSENHAIN, S. L. ARCHBUTT AND S. A. E. WELLS. *J. Inst. Metals* (advance proof) **1923,** 19 pp.; *Engineering* **115,** 347–51.—The conditions which give the best results

are: (*a*) The ratio of cross-sectional area of mold (gray cast Fe) to that of the casting should be 3:1. (*b*) The mold, dressed with a thick paste of plumbago and lubricating oil applied in a thin film, should be heated to 150° to 200° and used tilted to an angle of 30° to the vertical. (*c*) The temp. of the alloy (Cu 4, Ni 2, Mg 1.5, Al 92.5%) in the crucible during melting should not exceed 800°. (*d*) The molten alloy should be poured at 750° in a slow stream, striking the mold as near the top as possible to avoid the danger of a "hot spot." (*e*) The time taken to fill the mold 7 in. deep by 1 in. in diam. should be not less than 10 sec. Rods cast in accordance with the above conditions show tensile strength of approx. 20 tons per sq. in. and from 5 to 6% extension on 2 in. No change in density has been observed from heat-treatment. No advantage has been obtained with this alloy with graphite molds in place of cast-Fe molds. Detns. of resistance to alternating stresses indicate a safe fatigue range of ± 7.1 tons per sq. in. The use of temps. exceeding 525° during heat-treatment in a salt bath causes blisters to form on the surfaces of castings. Excellent results have, however, been obtained from tensile tests machined from blistered rods. At a temp. of 520° ± 5°, 6 hrs. is a sufficiently long period of heating. The plunging of the cast rods at normal temp. directly into the salt bath at 520° is safe and does not cause cracking. Similar remarks apply to the quenching operation after heating at 520° in boiling H_2O.

V. O. HOMERBERG

Heat treatment and mechanical properties of alloys of aluminium with small percentages of copper. D. HANSON AND MARIE L. V. GAYLER. *J. Inst. Metals* (advance proof) **1923**, 13 pp.; *Engineering* **115**, 343–4.—Cu-Al alloys contg. 0 to 2% Cu are not appreciably affected by quenching from 500° and subsequent aging. Alloys contg. 2.5 to 5% Cu are profoundly affected by this form of heat treatment. The strength of a rolled and annealed 5% alloy is increased from 12 to 23 tons per sq. in. as a result of quenching and aging; at the same time the elongation is high. Further treatment of quenched and age-hardened material, at a temp. higher than the normal, does not improve the tensile strength, but in some cases the Brinell hardness is increased.

V. O. HOMERBERG

Density and the hardness of the cast alloys of copper with tin. HAROLD HEAPE. *J. Inst. Metals* (advance proof) **1923**, 19 pp.—The algebraic sum of the changes in vol. occurring on alloying and during subsequent solidification is in every case negative. Though the density and the hardness are related, it is not possible to det. the exact relationship by means of detns. made on cast alloys. The hardness curve obtained by H. does not fit in with the hardness theory of Kurnakow and Zemczuzny. It is very difficult to obtain sound castings with the Cu-rich alloys. V. O. H.

Constitution and age-hardening of the ternary alloys of aluminium with magnesium and copper. MARIE L. V. GAYLER. *J. Inst. Metals* (advance proof) **1923**, 20 pp.; cf. *C. A.* **16**, 3861.—At 400° Cu is practically insol. in Al in the presence of Mg. Alloys of Al low in Cu and Mg do not possess the property of age-hardening after quenching from 400°. Some alloys contg. less than 2% Mg, and more than 1% Cu, age-harden after quenching from 400°. It is suggested that this fact, which is contrary to results expected after studying the constitution of the alloys, is due to the influence of Mg_2Si, the presence of which in all these alloys could not be avoided. With more than 8% Mg, the ternary compd. γ appears. The narrow region in compn. in which the compd. γ first appears at 400° in the presence of β is shifted with falling temp. so that the lowest concn. of Mg at which this substance appears is thus reduced from about 8 to 6%. Alloys contg. over 10% Mg, with 1% or more Cu, show the compd. δ present as one of the constituents. V. O. HOMERBERG

Preparation and properties of pure iron alloys. III. Effect of manganese on the structure of alloys of the iron-carbon system. H. S. RAWDON AND F. SILLERS, JR. Bur. Standards, *Sci. Papers* No. **464**, 637–53(1923).—Mn plays at least 3 distinct roles in C steels as deoxidizer, "desulfurizer," and as a hardening element. The effect of Mn upon the structure, and hence upon the properties, of Fe-C alloys was detd. in an extensive series of alloys varying from 0 to 1.6% C and 0 to 2% Mn in the annealed and the normalized condition. The effect of Mn may be described as a "restraining" influence, so that pearlite in C steels even after annealing has a fine-grained sorbitic structure such as results ordinarily upon more rapid cooling. The mechanical properties are correspondingly raised. The eutectoid ratio of C steels is lowered by Mn from 0.9 to approx. 0.78% C by 1% Mn. In the annealed alloys Mn appears to have no influence on grain size; in specimens which were cooled more rapidly—that is, normalized—the grains of the alloys of high Mn content were much smaller than in similar alloys of lower Mn. This structural feature also has its effect upon the mechanical properties. V. O. HOMERBERG

Mechanical properties of magnesium alloys. LESLIE AITCHISON. *J. Inst. Metals* (advance proof) **1923,** 5 pp. *Engineering* **115,** 312(1923).—The main conclusion is the great superiority as regards mech. properties possessed by the alloys that have been worked, whether hot-worked by forging or extruding, or cold-worked by strip-rolling. V. O. HOMERBERG

A phenomenon observed during tension tests on alloys during transformation. ALBERT PORTEVIN AND FRANÇOIS LE CHATELIER. *Compt. rend.* **176,** 507–10(1923).—In applying the tension test to tempered Al alloys, the stress increases not continuously but by repeated oscillations. The amplitude of the oscillations increases with the load and reaches 4% of the total load at max. stress. The frequency is several oscillations per sec. The rate of loading corresponded to an elongation of 8% per min. Piobert slip lines appear at the same time. This phenomenon does not occur in alloys except during transformation. Curves are shown. F. W. COBB

The corrosion of lead and its alloys by sulfuric acid of various concentrations. A. LASSIEUR. *Recherches et inventions* **4,** 254–61(1923).—After briefly reviewing previous work on the subject and showing their lack of agreement, L. describes expts. which gave such erratic results that he concludes that the corrosion is affected by some factors as yet unknown. A. PAPINEAU-COUTURE

Corrosion as affecting the metals used in the mechanical arts. W. H. HATFIELD. *Engineer* **134,** 639–43; *Engineering* **114,** 747–8(1922); *Bull. Cleveland Tech. Inst.* **2,** No. 3, 167(1923).—The compn., mechanical properties and resistance to corrosion of several types of iron and steel, of Al and Cu alloys are described. Corrosion tests applied included the action of running water, alternate wet and dry periods, steam at 100°, sea water, vinegar, AcOH, citric acid, solns. of 5% NH_4Cl, 1% $MgCl_2$, 10% Na_2SO_4 and 33% NaOH. Nichrome gave best results followed by 14% chromium steel, aluminium, monel metal, tantiron and 30% nickel steel. D. B. DILL

Chromizing. F. C. KELLEY. *Trans. Am. Electrochem. Soc.* **43,** preprint(1923).—A description of a process of coating Fe with a Fe-Cr alloy. The Fe object is packed in a mixt. of 45% Al_2O_3 (dilg. agent), and 55% Cr powder (95% pure). Next by heating to 1300–1400° in a H atm., the Cr diffuses into the Fe. Close contact between the Fe and Cr is essential. Presence of much C is undesirable. The finished surface is silver-white and remarkably soft even with 10–15% Cr. Chromized surfaces show high resistance to 10% HNO_3, but disintegrate rapidly in dil. HCl and H_2SO_4. Chromized turbine buckets gave excellent service. Photographs show the microstructure. Tables and curves show penetration, which increases with time and temp. Furnace details are given. Ni, Mo, and W can likewise be chromized. The chromized surfaces may be heat-treated or carbonized. C. H. ELDRIDGE

The scleroscope hardness test. A new form of magnifier hammer. R. GENDERS. *J. Inst. Metals* (advance proof) **1923,** 17 pp. E. H.

Symposium on hardness testing. A. E. BELLIS, *et al. Trans. Am. Soc. Steel Treating* **3,** 480–501(1923).—Significance and descriptions of different hardness tests and app. W. A. MUDGE

Tests on work-hardened aluminium sheet. H. C. H. CARPENTER AND C. C. SMITH. *J. Inst. Metals* (advance proof) **1923,** 37 pp.; *Engineering* **115,** 316–8(1923).—Long-period heating tests on the rate of softening of work-hardened Al sheet have been carried out in the temp. range 200° to 100°. The total period of the test was 41,000 hrs. (4.68 yrs.). Mech. tests were carried out on the sheet from time to time. After 2.46 yrs. the specimens were cooled to the ordinary temp. and maintained there for 2 months, and then reheated to the original temps. The heating was continued for a further period of 2.22 yrs. After the first period (2.46 yrs.) the percentage losses of work-hardness were, for 200°, 66; 175°, 51; 150°, 42; 125°, 36; 100°, 23. After the resumption of the tests following on the 2 months' interval at the ordinary temp., the specimens gained in tenacity, and after the total period of 3.65 yrs. the percentage losses of work hardness were, for 200°, 57; 175°, 40; 150°, 30; 125°, 24; 100°, 11. After 4.68 yrs. the percentage loss of work-hardness in the specimens heated at 200° was the same as after 2.17 yrs., whereas in the specimens heated at 150°, 125°, and 100° it was less. Structural changes in the sheet are very slight even after 4.68 yrs. at the temps. in question. There are slight evidences of surface recrystn., of the development of a granular structure, and the blurring of the original boundaries of the flattened crystals. Nothing like a general recrystn. takes place, such as is observed at temps. from 250° upwards. Tests carried out for 4.14 yrs. at 75° and 50° show that the retention of work-hardness was practically complete. Slight fluctuations in tenacity occur, but, viewed from a practical standpoint, no loss of work-hardness occurs. At air temps. no work-hardness is lost during 5 yrs. The influence of thickness was tested for sheets of 3 different

thicknesses at 3 different temps. Viewing the results as a whole, the differences in the rate of loss of work-hardness were not large, but they tended to be larger the greater the amt. of work done on the sheet. At 125° sheet of 99.65% purity retained its work-hardness more than twice as well as sheet of 98.9% purity over a period of 5000 hrs. Elastic limit detns. of the sheets gave values of about 3.5 tons per sq. in. for the work-hardened sheet, and about 1.1 to 1.2 tons for the completely softened sheet. No yield point was detected in any of the tests of the annealed sheets, and it was discovered faintly in only 1 of the tests of the hardened sheet. Values of the modulus of elasticity are given. V. O. HOMERBERG

The hardness of annealed copper. A. L. NORBURY. *J. Inst. Metals* (advance proof) **1923,** 16 pp.—A more definite expression for the Brinell hardness of Cu was obtained. V. O. HOMERBERG

The hardness of certain copper α-solid solutions. A. L. NORBURY. *J. Inst. Metals* (advance proof) **1923,** 13 pp.—The hardness of certain Cu-rich α-solid solns. are measured in order to compare the relative effects of different elements in increasing the hardness of Cu. The ultimate object was to det. if an element's "hardening" capacity could be correlated with one of its other at. properties, such as its at. vol. The hardness of alloys of Cu contg. various percentages of Al, Ni, Zn, Ag, and Sn, in solid soln. were measured. V. O. HOMERBERG

Modulus of direct elasticity of cold-drawn metals as a function of annealing temperature. F. C. LEA, V. A. COLLINS AND E. A. F. REEVE. *J. Inst. Metals* (advance proof) **1923,** 17 pp.—The expts. described are part of a number of investigations to det. the effect of cold-work and subsequent heat-treatment on the properties of certain metals. V. O. HOMERBERG

Extrusion defect in brass rods extruded from a multiple die. R. GENDERS. *J. Inst. Metals* (advance proof) **1923,** 3 pp.—The formation of the defect is due to the turning inwards of the billet skin to follow a funnel-shaped course to the die. V. O. HOMERBERG

Electric potential of antimony-lead alloys (MUZAFFER) **2.** Refractory containers for molten metals (Can. pat. 229,316) **19.**

Mineral Industry of the British Empire and Foreign Countries. Molybdenum (1913–1919). Imperial Mineral Resources Bureau. London: H. M. Stationery Office. 87 pp. 1s. 6d.

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RASTALL, R. H.: **Molybdenum Ores.** Imperial Institute Monographs. London: John Murray, Albemarle St., W. 86 pp. 5s.

WOOLWICH RESEARCH DEPARTMENT. **German Gun Steels.** R. D. Report No. 57. London: H. M. Stationery Office. 16 pp. 3s.

Hardening metals. E. J. DICKINS. Brit. 185,564, July 6, 1921. A mixt. consisting of 56% of kaolin, 19% of $BaSO_4$, 19% of powdered silica, and 6% of Na_2SiO_3 soln. (d. 1.2) is applied as a protective coating to parts of articles not to be carburized in a case-hardening process and, on account of its heat-insulating properties, may also be used for preventing hardening of parts during quenching in the heat-treatment of iron, etc. The mixt. is prepd. by drying, grinding, and mixing together kaolin, $BaSO_4$, and SiO_2, and adding Na_2SiO_3 in soln. in H_2O, and is applied with pressure to the surface to be protected, which is previously moistened with H_2O.

Leaching copper ores. J. IRVING. U. S. 1,451,734, Apr. 17. The leaching power of a soln. contg. H_2SO_4 and $FeSO_4$ is improved by contacting it with a pyritic mass before treating the cupriferous material with it.

Apparatus for ore amalgamation. F. A. BEAUCHAMP. U. S. 1,451,454, Apr. 10.

Amalgamator for treating gold ores. W. C. MCLAUGHLIN. U. S. 1,451,099, Apr. 10.

Apparatus for the heat treatment of ores. G. H. CLEVENGER. Can. 230,059, Apr. 3, 1923. The app. consists of a reaction zone, a preheating zone and a sep. combustion chamber between the two zones. The heated charge is subjected to the heat of combustion of as much gas as is necessary to maintain the desired reducing conditions, subsequently effecting a complete combustion of such gas, burning additional fuel

and passing all the products of combustion obtained into contact with a fresh charge to preheat the latter.

Automatically acting lixiviation apparatus. G. HAGLUND. Can. 229,983, Apr. 3, 1923.

Refining copper-nickel mat. N. Y. HYBINETTE. Can. 229,457, Mar. 6, 1923. The Cu from a Cu-Ni sulfate soln. is cemented on a bessemerized Cu-Ni mat. The remaining mat and cement Cu are roasted and leached with H_2SO_4 to form $CuSO_4$ soln. This leached residue is reduced and dissolved with an acid Cu-Ni sulfate soln. with the introduction of air.

Treating zirconium ores. L. E. BARTON and C. J. KINZIE. U. S. 1,451,004, Apr. 10. Ores contg. Zr and undesired substances such as Ti and Fe compds. are heated with $NaHSO_4$ and the resulting material is lixiviated to remove other materials from the Zr-contg. residue.

Extracting chromium, zirconium, vanadium, uranium, cobalt, silver or nickel from ores. A. L. D. D'ADRIAN. Can. 229,726, Mar. 20, 1923. The finely divided metal is acted upon with Cl gas to form chlorides which are volatilized and selectively condensed.

Metallurgical processes. F. M. DORSEY. Can. 229,381, Mar. 6, 1923. Ground wolframite ore mixed with Na_2CO_3 and $NaNO_3$ is fused and the fused product agitated in a dissolving tank where the Na_2WO_4 goes into soln. The soln. is filtered and the filtrate meets a flow of HCl in a pptg. vat from which the ppt. is removed and washed with dil. HNO_3 wash water soln. The $W_2O_5(OH)_2$ may then be dried to obtain the oxide in powd. form or fed to a filter to produce a sludge coke of the oxide. The process is applicable to Mo and similar metals.

Metallurgical furnaces. A. M. GOW. Can. 229,235, Feb. 27, 1923. In the operation of gas-fired furnaces a premixt. of gas and air is made by directing jets of air at relatively high pressure against the streams of incoming gas and air. A furnace structure is specified.

Furnaces. A. M. GOW. Can. 229,234, Feb. 27, 1923. In operating open-hearth furnaces a supply of air is delivered to the gas passages by moving the air with a small stream of compressed air. App. is also specified.

Open-hearth furnaces. B. P. WHEELER. Can. 230,092, Apr. 3, 1923. In the operation of open-hearth furnaces a supply of air is delivered into the gas uptake adjacent the gas part. The furnace structure is specified.

Purifying molten tin or lead. W. T. DAVIS. U. S. 1,452,364, Apr. 17. Molten Pb or Sn is purified by liberating air in the lower part of the molten mass to be purified and permitting the air to pass up through the metal, to bring dust and dirt to the surface.

Method of working tungsten. A. LEDERER. Can. 229,024, Mar. 27, 1923. Ductility is imparted to W by alternately working the metal in a coherent form at a red heat and heating the metal in a non-oxidizing atm. to above 1000°.

Alloy. JOHN G. HOMAN. Can. 229,224, Feb. 27, 1923. An alloy having an elec. resistance superior to Fe contains Fe, Si 1–6, C 0.1–0.25 and Mn 0.20–1%, the relation of the Si and Mn being such that as one of them is increased or diminished, the other is also more or less increased or diminished.

Iron-copper-aluminium alloy. C. J. ZAISER. U. S. 1,452,232, Apr. 17. An alloy which may be worked like steel is formed of Fe 13–60, Cu 82–30 and Al 5–10%.

Composition for silver-plating metals. L. M. SHEROW. U. S. 1,450,926, Apr. 10. A compn. adapted for Ag-plating forks, knives, spoons or other metal articles is formed from $AgNO_3$, camphor, a cyanide soln. and whiting. In use, the compn. is rubbed on the article.

10—ORGANIC CHEMISTRY

CHAS. A. ROUILLER AND CLARENCE J. WEST

Action of alcohol on the sulfates of ammonium. H. B. DUNNICLIFF. *J. Chem. Soc.* **123**, 476–84(1923).—$(NH_4)_2SO_4$ is not attacked either by dry EtOH or dry Et_2O. Et_2O has no action on NH_4HSO_4 except to ext. traces of moisture or free H_2SO_4 from it. $(NH_4)_3H(SO_4)_2$ may be prepd. by the action of 5–7 parts dry EtOH on dry NH_4HSO_4 and subsequent washing with Et_2O. This salt is not deliquescent and decomps. before melting. Com. NH_4HSO_4 is a mixt. of NH_4HSO_4 with $(NH_4)_3H(SO_4)_2$ and a little H_2O. Alc.-H_2SO_4 reacts with the $(NH_4)_2SO_4$ and NH_4HSO_4 more rapidly than with Na_2SO_4 and $NaHSO_4$. With NH_4HSO_4 the equil. between the liquid and solid phases ap-

peared to be established and the results suggest changes of solid phases at about 7% concn. and somewhere between 21 and 31% concn., resp. C. J. WEST

Catalytic dehydration of alcohols by dilute sulfuric acid. J. B. SENDERENS. *Compt. rend.* **176,** 813–6(1923); cf. *C. A.* **17,** 529.—Olefins and ethers were obtained in the catalytic dehydration of EtOH, PrOH, iso-PrOH, BuOH, iso-BuOH, and iso-AmOH by dil. H_2SO_4 at the b. p. of the mixt. Increasing the amt. of H_2SO_4, *i. e.*, raising the b. p. of the mixt., favors the formation of the olefins. To produce the ether the amt. of H_2SO_4 is diminished as the mol. wt. of the alc. increases. A. C. PURDY

Dependence of rotatory power on chemical constitution. XIX. The rotatory and refractive dispersions and the absorption spectrum of *d*-γ-nonyl nitrite. R. H. PICKARD AND HAROLD HUNTER. *J. Chem. Soc.* **123,** 434–44(1923); cf. *C. A.* **17,** 1422.—The very substantial agreement between the values obtained for the wave length of the dominant band in the spectrum of γ-nonyl nitrite furnishes strong evidence in support of the equations proposed for rotatory dispersion by Drude and for refractive dispersion by Sellmeier and also furnishes evidence in favor of some connection between refractive index and rotatory power such as was sought on theoretical grounds by Livens, and exptly. by Peacock. *d-γ-Nonyl nitrite,* prepd. by slowly passing NOCl into *d*-γ-nonanol in C_5H_5N, bright yellow mobile liquid, with a pleasant nitrous ethereal odor, b_{14} 83–4°. Rotatory and refractive dispersions for a no. of wave lengths are reported. C. J. WEST

Perhalides of quaternary ammonium salts. F. D. CHATTAWAY AND GEORGE HOYLE. *J. Chem. Soc.* **123,** 654–62(1923).—The perhalides are prepd. very easily by adding the appropriate halogen, in EtOH or AcOH, to a similar soln. of the quaternary NH_4X. *Tetramethylammonium dichlorobromide,* by satg. Me_4NBr in AcOH with Cl, pale yellow, m. 159°. *Chlorobromoiodide,* golden yellow, m. 205°, from Me_4NBr and ICl in AcOH. *Tribromide,* bright orange, m. 118.5°. Further addn. of Br gives a dark red oily liquid, then a semi-solid mass and finally a hard, dark red solid, corresponding to Me_4NBr_{13}; on exposure to the air, Br was gradually given off until Me_4NBr_3 was again obtained. *Diiodobromide,* dark crimson, m. 136°. H_2O decomps. this into Me_4NBr and Me_4NBrI_4. *Triiodide,* dark red by transmitted light, almost black, with a brilliant violet metallic luster by reflected light, m. 118°. *Pentaiodide,* m. 132° and has a brilliant green metallic luster. The heptaiodide could not be obtained, the next product being Me_4NI_9. *Dibromoiodide,* reddish orange, m. 192°. *Tetraiodochloride,* possessing a brilliant bluish green metallic luster and m. 110°. *Tetraiodobromide,* possessing a dark green metallic luster and m. 124.5°. *Hexaiodobromide,* m. 109° and possesses a dark green metallic luster. *Tetraethylammonium trichloride,* by passing Cl over Et_4NCl, pale yellow, very hygroscopic and m. 42–5°. *Dichlorobromide,* bright yellow, m. 69°. *Diiodochloride,* crimson, m. 93°. *Tetraiodochloride,* brownish red by transmitted light, dark blue metallic luster by reflected light, m. 107.5°. *Hexabromochloride,* dark red, m. 53°. It exists at the ordinary temp. only under a considerable tension of Br. *Dibromochloride,* by allowing Et_4NClBr_6 to stand over lime, or from the components in AcOH, bright orange, m. 79°. *Dichloroiodide,* bright yellow, m. 98°. *Tetrachloroiodide,* bright yellow, decomps. 173°. *Dibromoiodide,* reddish orange, m. 125°. *Tetrapropylammonium chlorobromoiodide,* orange, m. 143°. *Tetrachloroiodide,* bright yellow, decomps. between 148–60°. *Dichloroiodide,* pale yellow, m. 145°. *Dibromoiodide,* orange, m. 140°. *Triiodide,* dark crimson, with brilliant violet metallic luster by reflected and orange-red by transmitted light, m. 97°. *Pentaiodide,* m. 82° and possesses a brilliant dark green metallic luster. *Heptaiodide,* m. 85° and possesses a dark blue metallic luster. C. J. WEST

Pseudo-bases. IV. A new synthesis of tertiary amines of the form $RCH_2NR'R''$. GERTRUDE M. ROBINSON AND ROBERT ROBINSON. *J. Chem. Soc.* **123,** 532–43(1923); cf. *C. A.* **15,** 3977.—If ROH is a readily accessible alc. convertible into a Grignard reagent, it is possible to produce in a simple operation a base of the formula $RCH_2NR'R''$, the CH_2 group being derived from HCHO. *Dimethylaminomethyl isobutyl ether,* from aq. Me_2NH, HCHO and Me_2CHCH_2OH, b_{763} 124–6° (yield, 40%). *Diethylaminomethyl butyl ether* (I), b_{754} 172–4° (yield, 80%). *1-Butoxymethylpiperidine,* from HCHO, $C_5H_{11}N$ and BuOH, b_8 96°. *1,4-Dibutoxymethylpiperazine,* b_{10} 174° (yield, 33%). *Di[butoxymethyl]methylamine,* $NMe(CH_2OBu)_2$, b_{15} 111°. *Methyldiethylbutoxymethylammonium iodide, periodide, perchlorate, mercurichloride, ferrichloride* and *ferricyanide* are sparingly sol. oils. The *chromate* and *oxalate* are readily sol. salts. The *chloroplatinate,* orange-yellow, m. 204° (decompn.). *Methyldiethylamine chloroplatinate,* pale orange-yellow, m. 231°. Contact with foreign metals should be avoided in the manipulation of Pt compds. *Benzyldiethylamine chloroplatinate,* formed by the action of I and $PhCH_2Cl$, and addn. of $PtCl_4$, pale buff plates, m. 203°. Δ^7-*Buten-*

yldiethylamine, from I and CH_2:$CHCH_2MgCl$, b_{767} 132°. *Picrate*, golden yellow, m. 60°. *δ-Methylamyldiethylamine*, b. 172°. *Chloroplatinate*, pale orange, m. 101°. *1-Amylpiperidine*, b_{769} 196°. *Picrate*, bright yellow, m. 107°. *1,4-Dipropylpiperazine*, b_{762} 206°. *Picrate*, intense yellow, changing into the *dipicrate*, bright yellow, darkens 250°, m. 258° (decompn.). *β-Phenyltriethylamine*, b_8 103°, b_{762} 223° (some decompn.). *Methiodide*, m. 109°. *α-Homonaphthyldiethylamine*, b_9 160°, b. 293°; *picrate*, yellow, m. 136–7°. C. J. WEST

The reaction of organo-magnesium compounds on nitriles. OMER DE BOOSERÉ. *Bull. soc. chim. Belg.* **32**, 26–51(1923).—α-, β- and δ-Chlorobutyric nitriles behave differently with EtMgBr. The *δ-nitrile* follows best the Blaise reaction; about 35% of the normal product (EtCOAm) and about 30% trimethyleneacetone are obtained. The formation of the latter is due to the fact that the trimethylenenitrile—produced by the loss of HCl in the 1,4 position—does not readily yield condensation products. The *β-nitrile* produces very little ketone according to the Blaise reaction, and none at all if an excess of the organo-Mg compd. is employed. The *α-nitrile* never gives ketones. *γ-Nitrile* produces a small quantity of a high-mol. condensation product, *viz.*, a polymer of trimethylenenitrile. Under the same conditions the *β-nitrile* furnishes a considerable quantity of a high-mol. product, *viz.*, a polymer of crotonic nitrile. The organo-Mg compd., in the first stage of this reaction, behaves like an alkali. Under the influence of the excess of the organo-Mg compd. the crotonic nitrile is further condensed. No higher condensation products are formed from the *α-chloro-α-nitrile* and organo-Mg compds. R. BEUTNER

The oxidation of hydrocarbons, with special reference to the production of formaldehyde. II. The action of oxygen on methane. T. S. WHEELER AND E. W. BLAIR. *J. Soc. Chem. Ind.* **42**, 81–92T(1923).—Following a similar procedure to, and with the same app. as that used in the oxidation of C_2H_4 (cf. *C. A.* **17**, 58), the *oxidation of* CH_4 (I) *by O* under varying conditions was investigated. Below 700° interaction was so slight that only qual. results were possible, but it was found that (1) the rate of thermal decompn. of I was far slower than its oxidation rate; (2) its rate of oxidation was much slower than that of C_2H_4; (3) the explosive limits of I and O were 5–60% I; (4) the ignition temp. range of I was 550–700°; and (5) to isolate HCHO (II), the period of heating had to be short, for it decompd. to yield H_2O and CO (in distinction to H and CO_2 according to the literature). The rate of reaction was very slow at 675°, doubled every 10° at 685–700°; increased rapidly at 700–20°, and less rapidly at 720–40°. Steam decreased the rate of reaction. Up to 695° no H or CO_2 was detected, for II was not decompd. but was oxidized to HCO_2H (III), which decompd. to H_2O and CO. At 700° the yield of II was increased, and it decompd. faster than its decompn. product, H, could be oxidized, so H was formed. CO_2 first appeared at 700°, and the ratio CO/CO_2 decreased with increasing temp., for the oxidation rate of CO increased and that of III approached its decompn. rate. Short heating and slow oxidation were the chief factors favoring a high yield of II. Only small amts. of III remained in any expt. and MeOH was not found in any expt. At 670–740° the % yield of II varied inversely with the temp. At high temps. excess of I gave better yields than equimol. amts. of I and O. Steam increased the yields of II. Detailed results are tabulated and show graphically the influence of temp. and gas concn. on the yields of II under varying conditions. H, CO and CO_2 are secondary products and their yields depended on the behavior of II. Their own oxidations were influenced by the time of heating, concn. of reacting gases, etc. Direct instead of circulation expts. at higher temps. showed that a little II was formed up to 820°, above which it decompd. completely. Above 820° C sepd., particularly if the O was low. Similar results to those with C_2H_4 were obtained with catalysts, except that with very short heating no II was detected. Surface action was similar to, but less pronounced than that of catalysts, traces of II being detected. Addn. of NH_3 stabilized the III formed. With short heating, equimol. mixts. of I and O gave the higher yields, but with longer heating and high temps. excess of I gave the higher yields. The expts. complete the gap between the low temp. and the detonation expts. of Bone (cf. *J. Chem. Soc.* **1902**, 535; **1903**, 1074; **1906**, 674), and the results agree with his hydroxylation theory, and the relatively high % of I oxidized to II and III lends additional support to this. Full details of the app., methods and precautions used are described. C. C. DAVIS

Trimethylacetaldehyde. ADOLF FRANKE AND HERMANN HINTERBERGER. *Monatsh.* **43**, 655–60(1923).—Me_3CCHO was prepd. by passing the vapors of Me_3CCH_2OH over brass turnings at a dark red heat, the yield being about 52%. The gases evolved in the process contained 0.5% CO_2, 11.5% unsatd. hydrocarbons, 13.4% CO and 70.03% H. Polymerized by a few drops of concd. H_2SO_4, $(Me_3CCHO)_3$, m. 82°, results. Heat-

ing with KCN in alc. gives a small yield of a compd., acid in character, m. 223°. C. J. WEST

Hexamethylenetetramine betaine. F. BOEDECKER AND J. SEPP. *Ber. pharm. Ges.* **32**, 339–44(1922).—On treating $ClCH_2CO_2H$ in warm $CHCl_3$ with finely powdered $C_6H_{12}N_4$ and allowing to stand overnight a cryst. mixt. of hexamethylenetetramine betaine-HCl (I) and $C_6H_{12}N_4$-$ClCH_2CO_2H$ was obtained, which with freshly pptd. and washed Ag_2O yielded *hexamethylenetetramine betaine*, $C_6H_{12}N_4(OH)CH_2CO_2H$. The aq. soln. is neutral and slightly sweet. The *Na salt* of I has 1 mol. H_2O of crystn., and was prepd. by treating aq. $ClCH_2CO_2H$ with Na_2CO_3 and powdered $C_6H_{12}N_4$ evapg. *in vacuo* and washing with EtOH. The *normal Cd salt* has 4, the *acid salt* 1 mol. H_2O of crystn. *Na Zn salt*, $C_6H_{12}N_4ClCH_2CO_2Na.ZnCl_2.H_2O$; *Hg salt*. W. O. E.

Autoxidation and anti-oxidizing action. Catalytic properties of iodine and its compounds. Case of acrolein. CHARLES MOUREU AND CHARLES DUFRAISSE. *Compt. rend.* **176**, 797–803(1923); cf. *C. A.* **17**, 1621.—The action of a very large no. of org. and inorg. I compds. in preventing the oxidation of acrolein was studied. All of the compds. exerted the same type of action: oxidation was at first retarded or entirely stopped for a period, and then accelerated. The action was of the same type, whether the I was in the ionic state or in org. compds., but the ionic I was more energetic in retarding the oxidation. The accelerating action appeared to take place when the I had undergone a reaction with the acrolein. This phenomenon suggests a possible explanation of the role of I in regulating the action of the *thyroid gland*. T. S. CARSWELL

α,β-Dihydroxypelargonic acid. WALTER KROHS. *Ber. pharm. Ges.* **32**, 336–8 (1922).—This *acid*, $Me(CH_2)_5CH(OH)CH(OH)CO_2H$, sinters 119°, m. 123°, was obtained by oxidizing nonylic acid with 2% $KMnO_4$. Treatment with 60% H_2SO_4 failed to yield any unsatd. acid; the formation of a mixt. of anhydrides was observed. Treatment with 60% H_2SO_4 and 40% AcOH yielded a *mono-Ac compd.* Cinchonine effected scission of the inactive acid into 2 optical antipodes, $[\alpha]_D^{16}$ —17.44° and 13.68°, resp. Further oxidation yielded *via* the *nitrate*, $Me(CH_2)_5[CH(O.NO_2)]_2CO_2H$, *diketopelargonic acid*, $Me(CH_2)_5COCOCO_2H$, m. 95–6°, yielding a *disemicarbazone*, m. 160°, and a *dihydrazone*. W. O. E.

Chloroiodoacetic acid. HOLLAND CROMPTON AND KATE M. CARTER. *J. Chem. Soc.* **123**, 576–7(1923).—*Chloroiodoacetic acid* results by the interaction of ClCH:CClOEt and ICl in a sealed tube at room temp. for 3 weeks and decompn. of the acid chloride with H_2O. It m. 90° and is not perceptibly hygroscopic; it does not change on exposure to air but its solns. are very sensitive to light. *Barium salt*. The crude acid chloride and dry NH_3 give the *amide*, m. 140°, while the *anilide* m. 142°. *Phenyl ester*, m. 110°. $CHClBrCO_2Ph$ and $CHClICO_2Ph$ do not form mixed crystals. The eutectic mixt., contg. 82.9% $CHClBrCO_2Ph$, m. 39.2°. C. J. WEST

The hydroxy acids contained in the oil from grape seeds. ÉMILE ANDRÉ. *Compt. rend.* **176**, 843–5(1923).—The HO acids in oil of grape seeds were sepd. by (1) fractional crystn. from petr. ether, and (2) fractional crystn. of the Li salts. The sapon. and I nos. showed that they could not be homologs of ricinoleic acid. T. S. CARSWELL

Ability of 1,3-glycols to form acetone compounds. J. BÖESEKEN AND P. H. HERMANS. *Ber.* **55B**, 3758–60(1922).—Although earlier workers were unable to isolate a *trimethylene glycol-acetone complex*, B. and H. have done so during a study of the equil. of these compds. with H_2O. The yield is small and the isolation difficult because of the volatility of the compd. with AcMe. It b. 123–5°, $n_D^{16.5}$ 1.4252, $d_4^{16.5}$ 0.9587. Similar compds. from other 1,3-glycols will be described later. The condensation may be carried out with any AcMe-sol. acid. C. J. WEST

Union of hydrogen with acetylene derivatives. XIII. Mechanism of the catalytic hydrogenation of dimethylhexinenediol. I. S. ZALKIND AND (MLLE.) M. S. PESHEKEROVA. *J. Russ. Phys. Chem. Soc.* **52**, 186–90(1920).—The values obtained by Zalkind and Pishchikov (*C. A.* **9**, 2067) for the velocity of hydrogenation of tetramethylbutinenediol in presence of colloidal Pd showed that, as the reaction proceeds, the value of *k*, calcd. from the formula for unimol. reactions, at first increases. Such increase was regarded as due to the gradual removal of the acetylenic glycol. Further expts. show that this is not the case. The velocity of the reaction is found to be greatly increased if the Pd is first satd. with H and then left for some time (60 hrs.) in contact with the acetylenic glycol prior to commencement of the hydrogenation. The retardation of the hydrogenation in its early stages is evidently due to the formation, either chemically or by adsorption, of intermediate compds. (Cf. *C. A.* **17**, 1365, 1453.) J. C. S.

The hydration of the dialkylethinylcarbinols and the preparation of α-hydroxymethyl ketones. RENÉ LOCQUIN AND SUNG WOUSENG. *Compt. rend.* **176**, 516–8 (1923).—The α-hydroxymethyl ketones of the type RR'C(OH)COMe were prepd. by agitating the dialkylethinylcarbinols with 4 times their wt. of a soln. contg. 200 g. H_2SO_4 and 30 g. HgO per l. *3-Ethylpentan-3-ol-2-one*, b_{13} 56–7°, b_{760} 163–5°, d_4^{11} 0.9353, n_D^{11} 1.4303; *oxime*, b_{13} 116–8; *acetate*, b_{12} 87–90°; *semicarbazone*, m. 155–6°; *semicarbazone of the acetate*, m. 145–6°. *3-Propylhexan-3-ol-2-one*, b_{14} 86–8°, b_{760} 195°, d_4^{11} 0.9124, n_D^{11} 1.4343; *oxime* b_{11} 134–5°, m. 67°; *semicarbazone*, m. 163°; *acetate*, b_{12} 107–9°. *3-tert-Butylbutan-3-ol-2-one*, b_{14} 70–2°, b_{760} 177°, d_4^{11} 0.9388, n_D^{11} 1.4442; *oxime*, b_{12} 124°, m. 67–8°; *semicarbazone*, m. 133–4°. *3-Nonylbutan-3-ol-2-one*, b_{12} 146–7°, d_4^{11} 0.8941, n_D^{11} 1.4472; *semicarbazone*, m. 131–2°. *1-Acetyl-1-cyclohexanol*, b_{11} 91°, d_4^{11} 1.1033, n_D^{11} 1.4726; *oxime*, b_{11} 146–7°, m. 94–5°. T. S. CARSWELL

Residual affinity and coördination. XV. Interactions of acetylpropionylmethane and the tetrachlorides of selenium and tellurium. G. T. MORGAN AND H. G. REEVES. *J. Chem. Soc.* **123**, 444–52(1923); cf. *C. A.* **17**, 997.—Because of the intricate chem. changes which have been observed with acetylacetone, it became of interest to study the next higher homolog. The lengthening of the β-diketone chain does not materially alter the nature of the reaction with $SeCl_4$. The condensation with $TeCl_4$ is simplified in that only one product was isolated. *Se acetylpropionylmethane* (*Se propionylacetone*) (I), was prepd. by slowly adding Cu acetylpropionylmethane (II) to $SeCl_4$ suspended in $CHCl_3$, care being taken to exclude moisture; I is pale yellow, m. 137°; the aq. NaOH soln. gradually decomps., with pptn. of Se. A by-product of the reaction is *Cu 3-acetylpropionylchloromethane*, yellowish green, m. 137–8°. I reacts with 2 mols. HI to give *diselenium bisacetylpropionylmethane*, $Se_2(C_6H_8O.OH)_2$, which did not solidify; *Cu salt*, mustard-yellow. HCN in Et_2O reacts with I to give *cyano-3-selenium acetylpropionylmethane*, m. 27.5°; $FeCl_3$ gives a red color; *Cu salt*, pale blue. *Se O,C-bisacetylpropionylmethane*, from I and II in $CHCl_3$, oily; *Cu salt*, greenish yellow. *Te acetylpropionylmethane dichloride* (III), m. 170–1° (decompn.). The action of $KHSO_3$ on III gives *Te acetylpropionylmethane*, golden yellow, m. 100°. The *dibromide* is pale yellow and m. 156° (decompn.). *Diiodide*, crimson needles, sintering 130° and intumescing 190°, or reddish purple needles, sintering 135° and intumescing 185°. *Te O-ethylacetylpropionylmethane trichloride*, by the action of EtCl upon III in $CHCl_3$ satd. with HCl, pale yellow, decomps. 120°. It slowly becomes brownish gray owing to elimination of traces of Te. $FeCl_3$ does not give a red color with the $CHCl_3$ soln. though this color develops on boiling. C. J. WEST

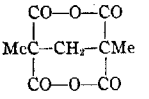
Rotatory dispersion of the esters of lactic acid. I. Normal esters. C. E. WOOD, J. E. SUCH AND FRANK SCARF. *J. Chem. Soc.* **123**, 600–16(1923).—In the homogeneous condition, the active alkyl lactates from the Me to the C_9 member exhibit complex rotatory dispersion of a normal and similar type. The mol. rotations of the series give a smooth curve, reaching a max. at the C_6 ester (or the C_7 ester at lower temp.). The max. at the C_6 ester and the abnormal value for the Am ester may be explained by assuming the helical structure for the C chain. With 2 exceptions, the rotatory power of the series increases with temp. The temp. effect in all cases is slight. The C_4 and C_8 lactates show max. in the temp. rotation curves. *Am l-lactate*, b_{8-9} 87.6–7.9°, $b_{21.5}$ 109.5–10.5°, $d_4^{21.2}$ 0.9638, α_{5893}^{25} 12.27°. *Hexyl deriv.*, b_{16} 107–8°, d_4^{20} 0.9520, $[\alpha]_D^{20}$ 12.21°. *Nonyl deriv.*, b_{20} 153–4°, d_4^{20} 0.9191, $[\alpha]_D^{20}$ 9.19°. The original should be consulted for the large no. of density and rotation values given. C. J. WEST

Preparation and reactions of bromopicrin. LOUIS HUNTER. *J. Chem. Soc.* **123**, 543–9(1923).—Ten g. picric acid and 60 g. Na_2CO_3 (about 25 equivs.) in a l. H_2O, treated with 26 cc. Br and exposed to the sunlight for 5–7 days, gave a 353% yield of *brompicrin* (35 g.), m. 9–7.10.3°, $d_4^{18.3}$ 2.799, $[R_L]_D^{25}$ 35.51. Varying amts. of Na_2CO_3 gave the following yields: 0, 285%; 11.6 g., 330%; 23.2 g., 342%; 34.7 g., 342%; 46.3 g., 350%; 57.9 g., 353%; 69.6 g., 353%; 100 g. NaOH, 190%; 100 g. H_2SO_4, 146%, while the time of reaction extended from 5 days to over 8 weeks. $[—C(NO_2):NO_2K]_2$ resulted by the interaction of CBr_2NO_2 and KOH, KI, KOEt and KCN. The yields of crude and pure salt from 25 g. CBr_2NO_2 were: 50 g. KOH, 18, 0.5; 18.8 g. KI, 8.2, 1.5; 12 g. K in EtOH, 33, 0.8; 23.5 g. KCN, 9.5, 1.7. CBr_4 was always present in the CBr_2NO_2, the smallest amt. being present when prepd. in an alk. medium; prolonged exposure to sunlight with excess of Br tends to increase the proportion of CBr_4. C. J. WEST

Ketenes. XLII. Preparation of ketenes from malonic anhydride. H. STAUDINGER, H. SCHLUBACH AND H. SCHNEIDER. *Helvetica Chim. Acta* **6**, 287–90(1923);

cf. *C. A.* **17**, 265.—It has previously been shown that the compds. $R_2C(CO.O.CO)_2CPh_2$ decomp. to give $R_2C(CO)_2O$ and $Ph_2C(CO)_2O$, the former further decompg. to give $R_2C{:}CO$ and CO_2. In attempting to extend this reaction and prep. mixed anhydrides, it was found that $Ph_2C{:}CO$ did not react to give the desired anhydride but $(Ph_2CHCO)_2O$ and polymerization products. **XLIII. Alkyl- and aryl-substituted ketoketenes.** H. STAUDINGER, H. SCHNEIDER, P. SCHOTZ AND P. M. STRONG. *Ibid* 291–303.—The previous method, the decompn. of substituted $H_2C(CO.O.CO)_2CPh_2$, has been found to be the most suitable method for the prepn. of pure $Me_2C{:}CO$ (I), $Et_2C{:}CO$ (II) and other derivs. *Methylethylmalonyldiphenylacetic anhydride*, from $MeEtC(CO_2H)_2$ and $Ph_2C{:}CO$ in Et_2O, m. 82° (decompn.). Heated *in vacuo* ***Me Et ketene*** (III), b_{12} —26° to —28° is formed. *Dipropylmalonyldiphenylacetic anhydride*, decomp. about 84°. *Dipropyl ketene* (IV), yellow oil with suffocating odor b_{11} 30°; yield, 32%, as detd. by conversion into *dipropylacetanilide*, m. 103–4°. The polymerized product, *tetrapropyldiketocyclobutane*, m. 61–2°, results by heating the ketene 10 days at 100°. *Dibenzylmalonyldiphenylacetic anhydride* (V), decomps. about 104°. From this *dibenzyl ketene* (VI), b $^1/_{12}$ 121–2°, is obtained in 73.5% yield. Ordinarily, because of polymerization during distn., the yield does not average more than 40%. Dibenzylacetanilide, m. 152°. The polymerization product, tetrabenzyldiketocyclobutane, m. 250°. A cryst. peroxide does not result by treating the ketene with O in Et_2O, but the product is partly polymerized. *β-Lactam of α,α-dibenzyl-β-phenyl-β-anilinopropionic acid*, from V and benzilideneaniline, and at once combining with Schiff's base, m. 121°. *Methylbenzylmalonyldiphenylacetic anhydride*, m. 91°; *methyl benzyl ketene*, (VIII), b_{3-4} 45–7°. This completely polymerizes in 1 day. *Diallylmalonyldiphenylacetic anhydride*, decomps. about 95–6°. *Diallyl ketene* (VIII), b_9 29–30°, b_{16} 131°, m.—123°, in 80% yield. *Diallylacetanilide*, m. 75–6°. *Tetraallyldiketocyclobutane*, b_9 135°. *Ethyl allylmethylmalonate*, b_{17} 112–5°. *Allylmethylmalonic acid*, m. 74–6°. *Allylmethylmalonyldiphenylacetic anhydride*, decomps. about 69–70°. *Allylmethyl ketene* (IX), yellow oil. *Trimethylenedicarboxyldiphenylacetic anhydride*, m. 81°. This decomps. violently upon heating but no odor of ketene is observed. The relative rate of polymerization at 25° of these ketenes is: **I**, 70% in 6 hrs.; **III**, 51% in 24 hrs.; **II**, 28% in 20 days; **IV**, 9% in 28 days; **VIII**, 75% in 5 days; **IX**, 69% in 1 day; **VI**, completely in 1 day, as does **VII**. **XLIV. Inorganic substituted ketenes.** H. STAUDINGER AND H. SCHNEIDER. *Ibid* 304–15.—The union of groups as halogen, HO, H_2N, etc., with chromophoric groups usually produces compds. which are colorless or slightly colored and which are much less reactive than the colored compds. produced by org. residues. The reverse is found to be true in the case of the ketenes. The substituted ketenes are very unstable and are deeper in color. *Ethylbromomalonyldiphenylacetic anhydride*, decomps. 88–9°. Decompd. under 15 mm. *ethylbromoketene* is obtained in 9% yield as a brownish yellow oil, $b_{1/10}$—40°. It quickly polymerizes upon warming. *Methylethoxymalonic acid*, m. 112°. *Methylethoxymalonyldiphenylacetic anhydride*, m. 86°. No $Me(EtO)C{:}CO$ was obtained upon decompn. of this anhydride, nor could any evidence be obtained of the existence of $Et(EtO)C{:}CO$. *Diethoxymalonic acid*, m. 159° (decompn.). *Diethoxymalonyldiphenylacetic anhydride*, m. 101–2°, decomps. 110°. No $(EtO)_2C{:}CO$ was found on its decompn. *Ethylphenoxymalonic acid*, m. 106° (*Et ester*, b_{12} 170–80°). *Ethylphenoxymalonyldi-, phenylacetic anhydride*, decomps. 94°. While $Et(PhO)C{:}CO$ could not be isolated, its formation was indicated by the reaction with $Ph_2C{:}NPh$, forming the *β-lactam of α-ethyl-α-phenoxy-β,β-diphenyl-β-anilinopropionic acid*, m. 164°. The velocity of this reaction is therefore greater than that of the polymerization of the ketene. *Diphenoxymalonyldiphenylacetic anhydride*, decomps. 79° (evolution of CO_2). Here again the ketene could not be isolated but its formation was evidenced by the prepn. of the *β-lactam of α,α-diphenoxy-β-phenyl-β-anilinopropionic acid*, m. 165°, and the corresponding *β-anisoyl deriv.*, m. 143°. *Diphenoxyacetanilide*, m. 120°. **XLV. Allene ketene.** *Ibid* 316–21.—Expts. with $PhCH{:}C(CO_2H)_2$ and $Me_2C{:}C(CO_2H)_2$, which were condensed with $Ph_2C{:}CO$, and the resulting anhydride decompd., showed that allene ketenes are not capable of existence. *Benzalmalonyl anhydride*, amorphous yellow powder, which is very hygroscopic and decomps. in a sealed tube with CO_2 evolution and formation of a resinous mass. Heated to 100° a thick brown oil is obtained. *Diphenylhydrazinomalonic acid*, m. 164°, yields, upon heating, CO_2, HCN and Ph_2NH. Benzylisonitrosomalonic acid does not react with $Ph_2C{:}CO$. Carefully heated, it decomps. into BzH and HCN. **XLVI. Diketenes.** H. STAUDINGER AND W. KREIS. *Ibid* 321–6.—Attempts to obtain diketenes have thus far failed. *Ethanetetracarboxylic dianilide.* The dianhydride is completely decompd., by heating in an abs. vacuum, without any trace of ketene formation. AcCl or $(CO_2Cl)_2$ does not react with $[:C-$

$(CO_2H)_2$]$_2$. Ph_2C:CO gives the anhydride and a brown amorphous mass. *Dimethyldicarboxyglutaric dianhydride,*



results by the action of Ph_2C:CO upon the acid, and m. 126–7°. Decompn. *in vacuo* gave no trace of a ketene. C. J. WEST

Decomposition of peroxides of succinic acid, fumaric acid and benzoic acid by heat and the relation to the behavior of the corresponding salts during electrolysis. FR. FICHTER AND ALBERT FRITSCH. *Helvetica Chim. Acta* **6**, 329–36(1923); cf. *C. A.* **13**, 560.—Electrolysis of $(CH_2CO_2K)_2$ gave C_2H_4 and CO_2 in the ratio of 1:2.4. When succinyl peroxide is heated in a bomb at 180° in the presence of air (good results are not obtained in an atm. of CO_2 or *in vacuo*) the resulting gas mixt. contains: CO_2 55.2%, C_2H_4 21.1; O_2 0.6, CO 6.5, N_2 9.7, CH_4 6.9; the ratio C_2H_4:CO_2 is 1: 2.6. Heated in $C_6H_4Me_2$, the ratio C_2H_4:CO_2 was found to be 1:2.25. In the electrolysis of $(HO_2CCH:)_2$ 19.9% C_2H_2 is obtained, while upon the decompn. of the peroxide in the bomb, 10.6%, and 15.7% are obtained. Benzoyl peroxide, decompd. as above, gave 80.2% of the theoretical amt. of CO_2 and 39.1% of Ph_2. The yield of the latter is sufficient to indicate that in the decompn. of the peroxide in the heat a Kolbe synthesis has taken place without electrolysis. C. J. WEST

β-Hydroxyglutaric dinitrile. R. LESPIEUX. *Compt. rend.* **176**, 754–6(1923).—A satd. soln. of KCN was added to the mononitrile, $CH_2ClCH(OH)CH_2CN$ (*Compt. rend.* **127**, 965(1898)), at 60–70°, the KCl filtered off, the filtrate concd. at 100° under 10 mm. and the residue fractionated, giving *β-hydroxyglutaric dinitrile* (I), b_{11} 202–3°, yellowish, viscous liquid, d_{22} 1.808, n_D 1.4805. I satd. with HBr gas, gave a cryst. mass m. 230°, which, neutralized in H_2O with K_2CO_3, yielded a cryst. ppt. of the *Br deriv.* (II), $CNCH_2CHBrCH_2CN$, m. 87–8°. II dissolved in HBr and evapd. on a water bath gave the *hydrobromide*, $CNCH_2CHBrCH_2CNHBr$, m. 230°. A. C. PURDY

Formation of derivatives of oxalacetic acid from tartaric acid. F. D. CHATTAWAY AND G. D. PARKES. *J. Chem. Soc.* **123**, 663–9(1923).—The 1st product of the reaction of primary aromatic amines upon AcOCH.CO.O.CO.CHOAc is a tartranil, AcOCH.CO.NAr.CO.CHOAc, which, by further action of the base, may yield [—CH(OH)CONHAr]$_2$ and AcNHAr, or ArN:CCO.NAr.COCH$_3$, $AcONH_3Ar$ and AcNHAr. The following anils were prepd.: *Diacetyltartaro-p-chloroanil*, m. 173°, $[\alpha]_D^{18}$ 106.86° (AcMe. *c* 2.84); *p-bromoanil*, m. 184°, $[\alpha]_D^{18}$ 81.58° (AcMe, *c* 0.95); *2,4-dichloroanil*, m. 158°, $[\alpha]_D^{18}$ 83.02 (AcMe, *c* 2.396); *2,4-dibromoanil*, m. 172°, $[\alpha]_D^{18}$ 58.01 (AcMe, *c* 2.55); *o-toluil*, m. 128°, $[\alpha]_D^{18}$ 99.42° (AcMe, *c* 2.062); *m-toluil*, m. 146°, $[\alpha]_D^{18}$ 112.04° (AcMe, *c* 0.54); *p-toluil*, m. 127°, $[\alpha]_D^{18}$ 118.54 (AcMe, *c* 1.316); *2,4-xylil*, m. 118.5°, $[\alpha]_D^{18}$ 166.4 (AcMe, *c* 0.88); *α-naphthil*, m. 166°, $[\alpha]_D^{18}$ 134.5° (AcMe, *c* 0.572). The use of an excess of $PhNH_2$ with I gives *phenyliminosuccinanil*, yellow, m. 232°. With excess Br it yields *s*-$C_6H_3Br_3$. Other anils were prepd. as follows: *p-Tolyliminosuccino-p-toluil*, golden yellow, m. 237°. *m-Tolyliminosuccino-m-toluil*, bright yellow, m. 162°. *p-Chlorophenyliminosuccino-p-chlorouanil*, bright yellow, m. 245°. *p-Bromophenyliminosuccino-p-bromoanil*, bright yellow, m. 260°. The action of *p*-$ClC_6H_4NH_2$ upon diacetyltartranil gives rise to *p-chlorophenyliminosuccinanil*, bright yellow, m. 268°. *Phenyliminosuccino-p-chloroanil*, bright yellow, m. 244°. C. J. WEST

New asymmetric dialkylbarbituric acids. I. Ethylalkyl series. M. TIFFENEAU. *Bull. soc. chim.* **33**, 183–8(1923).—A brief review is given of the known sym. and asym. dialkyl derivs. of barbituric acid (I). T. now reports 4 new members of the asym. series. EtBr with $NaBuC(CO_2Et)_2$ gave *diethylbutylethylmalonate*, b_{770} 240–5°, d_0 0.978. $BuEtC(CO_2H)_2$ (Raper, *C. A.* **2**, 993) m. 116°; loses CO_2 when heated, yielding *butylethylacetic acid*, b_{770} 220–4, whose *chloride*, b_{30} 85–90°, gives when warmed with urea *butylethylacetylurea*, m. 159°. Butylethylmalonylurea (Dox and Yoder, *C. A.* **16**, 2846) obtained by condensing urea and $BuEtC(CO_2Et)_2$, using NaOEt, m. 128° forms a piperazine salt, m. 150–5°. *Diethylisobutylethylmalonate*, from Na(iso-Bu)C-$(CO_2Et)_2$ with EtBr, b. 234–40° is sapond. by alc. KOH to iso-$BuEtC(CO_2H)_2$,

(Meldrum, *C. A.* **5**, 3571) m. 107–8°. When heated it loses CO_2, giving *isobutylethylacetic acid*, b_{20} 115°, b_{760} 213–6°, which with $SOCl_2$ gave the *chloride*, b_{760} 168–71°, and this with NH_4OH gave the *amide* m. 89°. Urea condensed with iso-$BuEtC(CO_2Et)_2$ to *isobutylethylmalonylurea*, m. 174°. The *piperazine salt*, m. 190°. *Diethyl isoamylethylmalonate*, b. 248–53°; the free *acid*, m. 116–8°; *isoamylethylacetic acid*, b. 228–32°, yields with $SOCl_2$ the *chloride*, b. 188–92, which with NH_4OH gave the *amide*, m. 106–8°. iso-$AmEtC(CO_2Et)_2$ condenses with urea to *isoamylethylmalonylurea*, m. 154–5°, has a bitter taste. $Bu_2C(CO_2Et)_2$ (Levene and Cretcher, *C. A.* **12**, 1546) and the free acid (II) were prepd. II was converted into *dibutylacetyl chloride*, b_{18} 100–2°, d. 0.972, and from this compd. was prepd. the *Br deriv.* This compd. was converted into *dibutylmalonylurea*, m. 58°. $Bu_2C(CO_2Et)_2$ with urea in the presence of NaOEt gave *dibutylbarbituric acid*, m. 153° (Kamm and Volweiler, *C. A.* **14**, 449, give 158°). **II. Homologous series.** Ch. Sommaire. *Ibid* 189–95.—Whereas the dialkyl derivs. of barbituric acids (I) are not very numerous because they progress in the series by 2 C atoms, the asym. acids are numerous, because the series progresses by single C atoms and there are more cases of isomerism. The asym. acids are well suited to a study of their hypnotic power. The max. of intensity of this power, as shown by Tiffeneau in the case of $C_{10}H_{16}O_3N_2$ and $C_{11}H_{18}O_3N_2$, has not been exceeded. The size of the mol. influences the soly. and on this largely depends the hypnotic power. However the Me derivs. are less active than the Et deriv. The Me (iso-Am) is about 2 times less active than the EtBu or Et (iso-Bu) derivs. and the MeBu and Me(iso-Bu) are less active than the PrEt compd. *Diethyl butylmethylmalonate* (II) obtained by warming $BuNaC(CO_2Et)_2$ with MeI, b. 235–41°, is sapond. by alc. KOH to the free *acid*, m. 98°. II condenses with urea in the presence of NaOEt to *butylethylmalonylurea*, m. 181°, having a bitter taste; H_2O dissolves 0.18 g. in 100 at 15° and 1.40 g. at 100°. *Diethylbutylpropylmalonate* (V), prepd. by warming PrBr with $BuNaC(CO_2Et)_2$ in the presence of NaOEt, b. 248–53°; free *acid* (III), m. 150–1°. III when heated at 180° for 3–4 hrs lost CO_2 and formed *butylpropylacetic acid* (IV), d. 0.914, which gives with $SOCl_2$ the *chloride*, b_{767} 192–5°, d. 0.947; this with NH_4OH forms the *amide*, m. 122–3°, 0.085 g. of which dissolves in 100 g. H_2O at 15°. V condenses with urea in the presence of NaOEt to *butylpropylmalonylurea*, m. 153°. Bu(iso-Bu)$C(CO_2Et)_2$ (Fischer, Holzapfel and Zwinner, *C. A.* **6**, 1003) condensed with urea to *butylisobutylmalonylurea*, m. 153°; 100 g. H_2O dissolves 0.075 g. at 15–20°. A table is given showing the soly. of the BuMe, BuEt, BuPr, Bu(iso-Bu) and di-Bu derivs. of I. The curve of the soly. rises and then falls. The BuEt deriv. is the most sol., the Bu(iso-Bu) is more sol. than the di-Bu compd. Irregularity of the radical increases hypnotic power. iso-$BuCH(CO_2Et)_2$ warmed with MeI and NaOEt gave *diethyl isobutylmethylmalonate*, b. 232–6°, which with urea gave *isobutylmethylbarbituric acid*, m. 195°; soly. in H_2O, 0.18% at 15°. *Isobutylpropylacetamide* (VI), needles, m. 121°, prepd. from NH_4OH and the chloride; soly. in H_2O, 0.055% at 15°. iso-$BuPrC(CO_2Et)_2$ condenses with urea, in the presence of NaOEt, to *isobutylpropylmalonylurea*, m. 164–5°; 100 parts H_2O dissolve 0.125 part at room temp. A table of the soly. of the isobutylmethyl, -ethyl, -propyl and -butyl derivs. of I is given. According to the general rule the soly. diminishes regularly as the number of C atoms increases. The BuMe and iso-BuMe compds. have the same soly. In the case of the BuEt and iso-BuEt derivs. the latter is less sol. and the BuPr is slightly less sol. than the iso-BuPr compd. *Diethyl isoamylmethylmalonate*, b. 242–7°; the free *acid*, m. 131–2°, evolves CO_2 on heating and yields *isoamylmethylacetic acid*, b_{15} 120–30°, d_0 = 0.887, whose *chloride*, $C_8H_{15}OCl$, b_{15} 69–71°, d_0 0.9574; *amide*, m. 103°. *Isoamylmethylbarbituric acid*, m. 108°, has a bitter taste; 100 g. H_2O dissolve 0.08 g at 15°. Iso-$AmNaC(CO_2Et)_2$ with PrI gave *diethyl isoamylpropyl malonate*, b_{760} 254–9°; free *acid*, m. 143–3.5°, loses CO_2 on heating and forms *isoamylpropylacetic acid*, b. 238–45°, d_0 0.908; *chloride*, b. 200–5°, d_0 0.944; *amide*, m. 117–8°. *Isoamylpropylbarbituric acid*, m. 134°. A table of the soly. of the iso-amylmethyl, -ethyl, -propyl and -amyl derivs. of I is given. The soly. decreases with increasing mol. wt. *Diethylheptylmalonate*, (VII), $C_{14}H_{26}O_4$, b. 273–5°, d_0 0.951 was prepd. from $C_7H_{15}I$ and $NaEtC(CO_2Et)_2$. *Diethyl heptylethylmalonate*, b_{15} 168–71°, from VII with EtI in the presence of NaOEt, condenses with urea in the usual way to *heptylethylbarbituric acid*, m. 118–9°. H. E. Williams

Utilization of tamarind. F. Marsden. *J. Ind. Inst. Sci.* **5**, 157–62(1923).—About 10% of *tartaric acid* was obtained from crude tamarind pulp by extg. with H_2O, fermenting the exts., distg. off the alc., heating the residual liquor in an autoclave at 50 lbs. pressure to remove coloring matter, and pptg. the tartaric acid with $CaCO_3$. The yield of EtOH from the fermentation was 11%. T. S. Carswell

Preparation of xylose from corncobs. A. R. Ling and D. R. Nanji. *J. Chem.*

Soc. **123**, 620–1(1923).—One kg. cobs is soaked with 2% NH_4OH overnight, washed free of NH_3, boiled with 8 l. 7% H_2SO_4 for 2 hrs., the hot ext. neutralized with pptd. chalk, the filtrate treated with 20 cc. 10% $Pb(OAc)_2$ for each l. of liquid, the Pb removed with H_2S, the pale yellow filtrate boiled with norit, filtered, concd. to a thin sirup, and treated 3 times with 95% EtOH. The yield of cryst. xylose is 10–2% of the cobs used. C. J. West

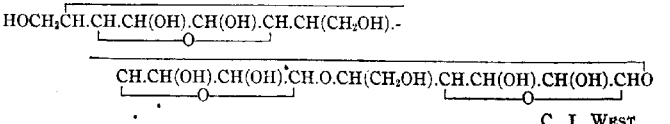
Diastatic hydrolysis of the glucosides of alcohols. Determination of molecular weight. H. Colin and A. Chaudun. *Compt. rend.* **176**, 440–2(1923).—The mol. wts. of the glucosides of MeOH, PrOH, iso-PrOH, BuOH, and iso-BuOH can be detd. by estimating the quantity of a standard soln. of enzyme which will produce the max. amt. of glucose in a 6% soln. of the glucoside in 24 hrs. at 36°. The product of the mol. wt. into the quantity of enzyme is const. T. S. Carswell

An experiment in the formation of isomeric sugar osazones. The isomeric forms of galactosazone. Olof Svanberg. *Arkiv. Kemi. Mineral. Geol.* **8**, No. 25, 19 pp.—The optical rotations of glucose and galactose phenylosazones in pyridine were accurately observed and it was found that previous methods of prepn. gave identical substances. Mutarotation was feeble. Isomeric forms of galactose phenylhydrazone and methylphenylhydrazones were prepd. and described. These forms did not appear to differ structurally. T. Swann Harding

The oxidation of glucose by yellow oxide of mercury and the preparation of gluconic acid. A. Blanchetière. *Bull. soc. chim.* **33**, 345–8(1923).—By the method of Heffter (*Ber.* **22**, 1049(1889)) it was found that gluconic acid was formed, but not as the Hg salt. The method was modified by the addn. of $CaCO_3$ to the refluxing mixt. of glucose and HgO, when a better yield of Ca gluconate was obtained. T. S. Carswell

Further observations on residual dextrins obtained from starch by diastatic action. C. J. Lintner and Max Kirschner. *Z. angew. Chem.* **36**, 119–22(1923).—Starch is not quant. hydrolyzed to maltose by diastase; achroödextrin II, which resists diastatic action, is also formed. To purify this an EtOH-C_5H_5N mixt. is best. Benzoylating is best done in pyridine and Bz and Ac detns. are best carried out by sapon. and titration of the excess of alkali. It is established from analysis of the Bz and Ac compds. that achroödextrin II contains the $C_6H_{10}O_5$ group. Achroödextrin II is not attacked by diastase or emulsin; takadiastase reduces it quant. to glucose; by the combined action of diastase and yeast it can be completely fermented. No compd. standing between maltose and achroödextrin II was isolated from hydrolyzed starch. T. Swann Harding

Constitution of polysaccharides. VI. The molecular structure of cotton cellulose. James Colquhoun Irvine and Edmund Langley Hirst. *J. Chem. Soc.* **123**, 518–32 (1923); cf. *C. A.* **17**, 1713.—The repeated methylation of cellulose with Me_2SO_4 (which is facilitated not so much by the use of a large excess of reagent as by frequent repetition of the treatment) gave after 14 treatments a product with 43.1% Me (corresponding to 85% trimethyl- and 15% dimethylcellulose). The yield is about 70%. Hydrolysis with MeOH-HCl in a sealed tube for 50 hrs. at 100° gave a product consisting of only 2,3,6-trimethylmethylglucoside, the yield of distd. product being 91.5%. Tetramethylglucose, monomethylglucose, glucose and γ-sugars were definitely absent from this product. Since the yields of cellobiose, which undoubtedly exists preformed in the cellulose mol., are extremely variable and rarely exceed 35% and the highest recorded figures are of the order 50–60%, a formula for cellulose has been proposed which will give a yield of cellobiose approx. to this figure rather than to the higher and theoretical value of 105.5:



C. J. West

Stereochemistry of the cyclopentane- and hydrindene-1,2-diols. Christiaan van Loon. *Diss. Tech. Hoogeschool Delft* 1919, 81 pp.—The wide discrepancies in the reported m. ps. of hydrindene-1,2-diol are due to *cis*- and *trans*-isomerism which previous investigators have overlooked. *trans-Hydrindene-1,2-diol* (I), m. 158.5–159°, was prepd. in 61% yield by sapon. of the acetate with alc. KOH and purified by sublimation. *Acetate*, b_{13} 169–9.5°, $d_{40}^{20.4}$ 1.1771, n_D^{20} 1.15170, prepd. by refluxing the di-

bromide (from indene and Br) with anhyd. AcOK in glacial AcOH and fractionating. *Benzoate*, m. 76.5–7.5°, in 76% yield from I with BzCl in pyridine. *Phenylurethan*, m. 206.5°, in 80% yield from I in C_6H_6 with PhNCO and Na. *Menthylurethan*, m. 153–170°, in 32% yield from I and *l-menthyl isocyanate*, was sepd. into the *l*-form, m. 200–201°, $[\alpha]_D$ −81°, and 2 fractions contg. mixts. of the *d*- and *l*-forms with lower m. p. and lower rotation. *Indene oxide* (II), m. 31–1.5°, $b_{19.5}$ 112.7–2.8°, b_{21} 125°, b_{38} 131°, $d_4^{23.6}$ 1.1258, $n_D^{23.1}$ 1.5627, was prepd. in 92–97% yield by mechanical shaking of the bromohydrin in anhyd. Et_2O with finely powdered KOH. *cis-Hydrindene-1,2-diol* (III), m. 107.5–108°, prepd. in 29% yield by oxidn. of indene in MeOH at −9° with 0.3 *M* $KMnO_4$, and in 35.8% yield by hydration of II in dil. AcOH and sepn. from the *trans*-isomer (8.5%) by crystn. or by crystn. of the mixed benzoates. *Benzoate*, m. 110.5°, in 78% yield from III and BzCl in pyridine. *Phenylurethan*, m. 205°, from III in C_6H_6 with PhNCO and Na. *Menthylurethan*, m. 189.4–190°, from III and *l*-menthyl isocyanate (yield 50%), could not be sepd. into optical isomers. *Polymorphic modification of* III, m. 100.5–1.5°, obtained by crystn. of the mixed isomers from PhMe, also by sapon. of the *cis*-benzoate. In small amts. it can be sublimed unchanged but on continued heating it rearranges to the stable form III. I, II and III are all converted into *β*-hydrindone by refluxing with dil. H_2SO_4. From the residue after steam distn. an impure *anhydro-bis-β-hydrindone*, m. 160–7°, was obtained. *β-Hydrindone oxime*, m. 153–4°. For the corresponding cyclopentane derivs. the m. ps. were found to be considerably higher than those recorded in the literature; *cis*-cyclopentane-1,2-diol m. 29–30°, b_{19} 132.5°; phenylurethan m. 205°; *trans*-cyclopentane-1,2-diol m. 54.5–55° $b_{21.5}$ 136°; phenylurethan, m. 221°. *cis-Cyclopentane-1,2-diol p-nitrobenzoate*, m. 116.5–117.5° (yield 68%) from the diol and 4-$O_2NC_6H_4COCl$ in pyridine. *trans-Deriv.*, m. 145–5.2°. The *cis*-structure of the lower melting cyclopentane- and hydrindene-1,2-diols was proved by the increase in cond. in the presence of H_3BO_3, due to the formation of a 5-membered ring in agreement with van't Hoff's hypothesis. The *cis*-diols also form condensation products with MeAc, whereas the *trans*-forms do not. *cis-Hydrindene-1,2-diolacetone*, m. 70.9°. *cis-Cyclopentane-1,2-diolacetone*, b. 148–50°, crysts. at −20°. Hydration of II in acid or neutral medium gives a mixt. of *cis*- and *trans*-diols, mostly *cis;* in alk. medium the product is almost exclusively *trans*. Cyclopentene oxide gives only the *trans*-diol whether in acid, neutral or alk. medium, because of a rearrangement of the *cis*-form. A. W. Dox

Problem of substitution in the benzene nucleus and the Thomson-Lewis-Langmuir theory of covalence. Ronald Fraser and James E. Humphries. *Chem. News* **126**, 161–8(1923).—Theoretical discussion of the directive influence of substituents already present in the nucleus of the C_6H_4 ring. The basis is the Thomson-Lewis-Langmuir theory of covalence, from which foundation an electronic interpretation of Lapworth's principle of induced alternate polarities has been built up. C. J. West

A new synthesis of cumene and *p*-cymene. L. Bert. *Compt. rend.* **176**, 840–2 (1923).—Cumene and *p*-cymene were obtained in 10% yield by the action of Pr_2SO_4 upon PhMgBr and MeC_6H_4MgBr, resp., in Et_2O. T. S. Carswell

Cymene and ethylbenzene from different sources. K. v. Auwers and H. Kolligs. *Ber.* **55B**, 3872–9(1922).—It has been shown (*C. A.* **16**, 2130) that the values for certain phys. consts., especially the mol. coeffs. of refraction of some C_6H_6 hydrocarbons, depend on the methods of prepn. Of 8 prepns. of cymene from different compds. the one from PhMe by the Friedel-Craft reaction showed the highest E value. This has been proved to be the *m*- rather than the *p*-compd. In the following outline the b. p., $M \times n_D^{20}$ and E values for *p*-cymene prepd. from various compds. are given. From $MeC_6H_4COMe_2$, 172°, 200.2, 0.73; from cuminal, 173–5°, 200.1, 0.63; from terpinene, 175–6°, 199.89, 0.42; from *α*-terpineol, 173°, 199.92, 0.45; from $MeC_6H_4CHMeCHCl_2$, 176°, 200.05, 0.58; from ajowan oil, 176°, 199.99, 0.52. Prepns. from camphor gave E-values less than 0.3, while one from spruce turpentine oil gave 0.13. Because of the possible spatial influence in compds. contg. 2 side chains these consts. were detd. for PhEt prepd. from various compds. From styrene, 136–6.5°, 159.41, 1.06; from PhCOMe, 136–6.5, 159.37 and 159.12, 1.02 and 0.77; from PhBr, 134.8–5.2°, 158.84, 0.49; from C_6H_6, 135°, 158.81, 0.46; from *p*-$EtC_6H_4SO_2NH_2$, 135–6°, 158.74, 0.39. The mean of 2 detns. of the heat of combustion of PhEt prepd. by Fittig's method was 1091.4 cal. and by Clemmensen's method 1089.3 cal. G. W. Stratton

The basic properties of the nitro group. Émile Cherbuliez. *Helvetica Chim. Acta* **6**, 281–6(1923).—*Nitrobenzene-sulfuric acid*, $PhNO_2.H_2SO_4$, m. 11°, forms as pale green crystals when a crystal of $PhNO_2$ is dropped into an equimol. mixt. of $PhNO_2$ and H_2SO_4 at −20°. Other NO_2 compds. of the aromatic and aliphatic series give the

same type of compds. Their formation is attributed to an addn. reaction, giving a compd. of the type [PhNH(:O)]HSO_4. Di-NO_2 compds. do not form such products.
T. S. CARSWELL

Isomorphism relations in the organometallic series. V. Saturated derivatives of the quinquevalent metals and metalloids. P. PASCAL. *Bull. soc. chim.* **33**, 170–80 (1923).—P. investigated the influence on the m. p. of mixts. of arsines, phosphines and stibines when O and S are introduced into these compds. Tables are given showing initial and final m. ps. of the following mixts. (ranging from 0 to 100% of each component): Ph_3AsO-Ph_3PO, Ph_3PO-Ph_3AsS, Ph_3PO-Ph_3SbS, Ph_3PS-Ph_3PO, Ph_3PS-Ph_3AsO, Ph_3PS-Ph_3AsS, Ph_3PS-Ph_3SbS, Ph_3AsO-Ph_3AsS, Ph_3AsS-Ph_3SbS, Ph_3SbS-Ph_3AsO, $(PhO)_3PO$-$(PhO)_3PS$, Ph_3PO-$(PhO)_3PO$, Ph_3PS-$(PhO_3)_2PS$, Ph_3PS-Et_3PS, $(PhO)_3PO$-$Me(PhO)_2PO$. There is found to be between Ph phosphate and Ph thiophosphate the same isomerphism relations as between Ph_3PO and Ph_3PS. H. E. W.

Preparation of aromatic sulfones. G. FOUQUE AND J. LACROIX. *Bull. soc. chim.* **33**, 180–3(1923).—When C_6H_6 is refluxed with H_2SO_4 in prepg. $PhSO_3H$, after several hrs.' warming H_2O and C_6H_6 appear in the condenser. F. and L. thought that if the H_2O was eliminated as fast as it is formed the course of the reaction would be modified. C_6H_6 and H_2SO_4 are mixed on the sand bath in a flask connected with a tubulated flask which in turn is connected to a condenser. The H_2O which refluxes is collected in the tubulated flask. An app. is described in which the H_2O which seps. in the condenser is recovered. After the 6th hr. H_2O commenced to form and the amt. did not increase after the 50th hour. The reaction product in the first flask poured while warm into cold H_2O, gives a cryst. ppt., which is freed of C_6H_6 with steam and extd. with Et_2O, yielding Ph_2SO_4, m. 128° (75–80% yield, based on the acid used). The H_2O into which the reaction product was poured contains $PhSO_3H$ equiv. to 15–20%. $PhSO_3H + C_6H_6 = Ph_2SO_2 + H_2O$ and $2PhSO_3H = Ph_2SO_4 + H_2SO_4$ are the equations for the reaction. This procedure was extended to the prepn. of other sulfones; C_7H_8 gave the sulfone obtained by Genvresse (*Bull. soc. chim.* [3] **9**, 707(1893)). App. are described for liquids heavier and for those lighter than H_2O. From PhCl, *4,4'-dichlorodiphenyl sulfone*, m. 146° was prepd.; from PhBr, *4,4'-dibromodiphenyl sulfone*, m. 171°, and from PhOH, *4,4'-dihydroxydiphenyl sulfone*, m. 240°. H. E. WILLIAMS

Autoxidation: theory of the mechanism of anti-oxidizing action. CHARLES MOUREU AND CHARLES DUFRAISSE. *Compt. rend.* **176**, 624–9(1923); cf. *C. A.* **17**, 1621.—The theory of the anti-oxidizing action of phenols and iodides is discussed at length, principally on the assumption that the phenols form peroxides. T. S. CARSWELL

Catalytic hydrogenation under pressure in the presence of nickel salts. II. Hexahydrodiphenyl oxide from *o*-diphenol. JULIUS V. BRAUN. *Ber.* **55B**, 3761–70(1922); cf. *C. A.* **16**, 4200.—Since PhOH is readily reduced to $C_6H_{11}OH$, it was of interest to study the behavior of $(o\text{-}HOC_6H_4)_2$. Instead of the hexa- and octahydro derivs. which were expected, the reaction product was a compd. $C_{12}H_{14}O$, *hexahydro-o,o'-diphenylene oxide* (I), b_{10} 138–41°. Passage through PbO at 670–80° gave diphenylene oxide. H_2SO_4 gave a monosulfonate. *Nitro deriv.*, m. 124–5°, which may be reduced to the *amino deriv.*, yellow, m. 56°, *hydrochloride*, softens 235°, m. 250°. *Picrate*, m. 186°; *acetate*, m. 123°. The action of AcCl and $AlCl_3$ upon I in CS_2 gives an *Ac compd.*, $C_{14}H_{16}O_2$, b_{18} 222–8°, m. 68°. *Oxime*, m. 167°. Reduction of the oxime gave the *base*, $Me(NH_2)CH.C_{12}H_{13}O$, b_{16} 210–3°; *hydrochloride*, m. 267–8°; *chloroplatinate*, ocher-yellow, decomps. about 200°; *picrate*, decomps. 250°. $(COCl)_2$ and I with $AlCl_3$ gave a *carboxylic acid*, m. 250°, which was not further investigated. Oxidation of I with CrO_3 gave *δ-o-hydroxybenzoylvaleric acid* (II), b_{12} 240–2°, m. 94°. The alk. soln. is yellow, the $FeCl_3$ reaction red-violet. *Oxime*, m. 128°. *Semicarbazone*, m. 186°. *Phenylhydrazone*, yellow, m. 173°. *Benzoate*, m. 82°. *Me ether*, m. 82°; *semicarbazone*, m. 175–6°. *Me ether ester*, m. 28°. Condensation of II with isatin gave *α-o-hydroxyphenyl-β-*[*γ'-carboxypropyl*]*-γ-cinchoninic acid*, m. 295° (decompn.). Heated with NaOH at 270°, II yields PhOH and adipic acid. Oxidation of the NO_2 deriv. of I gave the *m'-nitro deriv. of* II, yellow, m. 116°. C. J. WEST

Nitration of benzaldehyde and the monotropy of *o*-nitrobenzaldehyde. O. L. BRADY AND SAMUEL HARRIS. *J. Chem. Soc.* **123**, 484–94(1923).—Previous methods of nitrating BzH are discussed and details of an exptl. method given. From f. p. detns., the product so obtained is shown to contain about 19% $o\text{-}O_2NC_6H_4CHO$, the remaining being the *m*-deriv. No *p*-deriv. was found; the azine is a suitable deriv. for detecting the *p*-deriv. Time-cooling curves for pure $o\text{-}O_2NC_6H_4CHO$ showed that this exists in 2 forms, the β- or unstable form freezing at 37.9° and the α- or stable form at 40.9°. The unstable form can be obtained by fusing the aldehyde, cooling rapidly and scratching with a Pt wire. It m. 40° in a capillary tube as compared with 43.5° for

the stable modification. The β-compd. cannot be preserved for any considerable length of time, the change to the α-form starting after a few min. The effect of these 2 forms upon the f. p. curves of the *o*- with the other 2 derivs. is discussed. From the values obtained it would appear that in the nitration of BzH, followed by expression of the liquid and crystn. of the product, not much more than a 65% yield of pure *m*-deriv. could be hoped for. C. J. West

Constituents of Indian turpentine from Pinus longifolia, Roxb. II. J. L. Simonsen and M. G. Rau. *J. Chem. Soc.* **123**, 549–60(1923); cf. *C. A.* **14**, 2617.—A study of the oxidation products of the dicyclic terpene previously described confirms the conclusion that it is *d*-Δ^3-carene. The terpene was oxidized with neutral $KMnO_4$ in AcMe at 0° (48 hrs.). The acids were esterified and fractionated. It was possible to isolate and identify: $Me_2C(CO_2H)_2$, $HO_2CCMe_2CH_2CO_2H$, *cis*- and *trans*-caronic acids, *cis-homocaronic acid*, m. 136–7°; *Ag salt*. *α-1-α-Hydroxy-3-carboxy-α,1,1-trimethylcyclopropane-2-propionic acid* (I), m. 132–3°. $[\alpha]_D$ −8.7°. *Ag salt; Et ester*, b_{45} 184–5°. This is more easily sol. in H_2O than the *β-deriv.* (II), m. 192°, $[\alpha]_D$ −24.36°. The action of AcCl upon I gives a *lactone*, m. 174–5°. Oxidation of I with $KMnO_4$–H_2SO_4 gave *cis-1,1-dimethyl-2-β-ketopropylcyclopropane-2-carboxylic acid*, analyzed as the *semicarbazone*, decomps. 179–80°. Further oxidation gave *cis*-homocaronic acid. II, under the same conditions, gave the *trans-acid*, the *semicarbazone* of which decomps. 209°, $[\alpha]_D$ −70.98°. C. J. West

Wagner's rearrangement. II. The formation of santene. L. Ruzicka and Fr. Liebl. *Helvetica Chim. Acta* **6**, 267–81(1923); cf. *C. A.* **12**, 2545.—The action of $SOCl_2$ upon fenchyl alc. gives a *compound*, $C_{20}H_{34}O_3S$, m. 72°, which is probably an ester of H_2SO_3. If the action of PCl_5 is carried out at very low temps., the main product is a chloride which gives practically pure α-fenchene. O_3 gave α-fenchocamphorone which, transformed into the alc. by Na and H_2O and then heated with K_2SO_4, gave santene, b. 140–2°, d_4^{37} 0.8720, n_D^{17} 1.4657, optically inactive. This was also prepd. from a mixt. of β- and α-fenchocamphorol and from santenol. The *mechanism of the reaction* is discussed, for which the original should be consulted. C. J. West

Two definite compounds of nitrogen peroxide and camphor. Paul Pascal and Garnier. *Compt. rend.* **176**, 450–2(1923).—The f. ps. of mixts. of N_2O_4 and camphor (I) showed the existence of 2 compds.: (1) $5N_2O_4 + 4I$, m. −52°, and (2) $2N_2O_4 + 3I$, m. −45.5°. The system has 3 eutectics: (1) m. −60°, contg. 60.5% N_2O_4 and forming crystals of the compn. $5N_2O_4 + 4I$; (2) m. −55.5°, contg. 34.5% N_2O_4; (3) m. −46.5°, contg. 26% N_2O_4 and forming crystals of the compn. $2N_2O_4 + 3I$. T. S. Carswell

Transformation of campholic acid into camphor. H. Rupe and A. Sulger. *Helvetica Chim. Acta* **6**, 259–63(1923).—Benzylidenecampholic acid and $SOCl_2$ give a chloride which rapidly evolves HCl when heated at 60° and yields benzylidenecamphor, m. 97°. *Benzylcampholyl chloride*, b_{12} 167–9°, is stable. *Methyl benzylcamphol ate*, $[\alpha]_{20}$: C, 39.03°; D, 49.38°; Hg, 57.69; F, 75.32°; *benzylcampholic acid*, $[\alpha]_{20}$: 43.65°, 55.39°, 64.81°, 83.97°; *benzylidenecampholic acid*, $[\alpha]_{20}$: 9.94°, 12.60°, 14.48°, 19.019°. The following steps in the synthesis of camphor consist in oxidation with O_3, and reduction 1st to hydroxycamphor and then to camphor. C. J. West

The action of an alcoholic solution of caustic potash on ketones. VII. The action of an alcoholic solution of caustic potash on *p*-hydroxy- and *p*-ethoxybenzophenone and on their *m*-bromo derivatives. P. J. Montagne. *Rec. trav. chim.* **41**, 703–21 (1922).—The 2 reactions to be considered in the action of KOH-EtOH on $COPh_2$ derivs. are the transformation of CO into CHOH, and the substitution of halogen atoms by H. Previous work has shown that the nature of the substituents in the ring dets. the ease of reduction of the CO group. *E.g.*, M. (*C. A.* **15**, 63) found that the *p*-OH group prevents the reduction to CO; the introduction of a *p*-Br atom in the other ring does not improve the situation, but if the OH is converted into OEt the compd. can be reduced by prolonged boiling. The introduction of *p*-Br in the other ring in the OEt deriv. still further facilitates reduction. In continuing this study M. has studied the influence of Br in the *m*-position. $COPh_2$ heated for 2 days with KOH–EtOH is reduced. 4-$EtOC_6H_4COPh$ (I) was measurably reduced in 2 days but it required 6 days to complete it. 5,4-$Br(EtO)C_6H_3COPh$ (II) was not completely reduced after boiling 2 days. With 3,5,4-$Br_2(EtO)C_6H_2COPh$ (III) boiling 2 days resulted in complete reduction. The results are comparable with those obtained with $(m\text{-}H_2NC_6H_4)_2CO$. Results with 4,3′-$EtOC_6H_4COC_6H_4Br$ were doubtful owing to the formation of tar. Some of the hydroxybromobenzophenones were not disposed to undergo reduction even on prolonged heating even after introducing two *m*-Br atoms. In discussing the replacement of halogen M. has limited himself to replacement of the Br atom. Previously M. found that when a Br atom was present in the ring its replacement depended

on the presence of the CO group; when this is reduced to CHOH replacement is impossible. The formation of $CH(OH)Ph_2$ (IV) and $BrC_6H_4CH(OH)Ph$ (V) from $Br-C_6H_4COPh$ arises by two sep. simultaneous reactions. Suitable substitutions change the rate of formation of IV and V, resp. When III is boiled with KOH-EtOH there is formed, besides $3,5,4-Br_2(EtO)_2C_6H_2CH(OH)Ph$ (VI), a little $3,4-Br(EtO)C_6H_3CH-(OH)Ph$ (VII), in which 1 Br atom is replaced by H. The results showed by substitution of Br in this case that the shift in reaction velocity was in favor of the homolog of IV. The influence of the various groups in III was detd. by studying the influence of the EtO group in I and the Br atoms in $3,5-Br_2C_6H_4COPh$ (VIII). In boiling KOH-EtOH VIII gives $3-BrC_6H_4COPh$, showing that the substitution of Br by H is increased by the 2nd Br atom. The reduction of CO in I is slower than in $COPh_2$ itself. It is impossible to say just what influence the 2 Br atoms and the EtO group exercise on each other. From an analysis of the data in hand M. concludes that the CO is reduced and the Br atom is removed simultaneously and not successively. He suggests that at the moment of reduction the union of the Br atom becomes less firm and the Br is apt to be replaced by H. $4-Me(or\ Et)OC_6H_4COPh$ in AcOH + HBr (d. 1.49) was boiled for 2 days. Most of the AcOH and HBr were evapd. and $4-HOC_6H_4COPh$ (IX) was sepd. with H_2O (M. (*C. A.* **15**, 64)). $4-MeOC_6H_4COPh$ (M., *C. A.* **15**, 3476) was prepd. from $MeOC_6H_4COCl + C_6H_6$ or from BzCl + anisole. Full crystallographic data are given for I, VII and VI. On bromination in glacial AcOH IX gives only $3,4-Br(HO)-C_6H_3COPh$ (X), m. 183.25° (cf. Hantzsch, *Ber.* **39**, 3094(1906); Kostanecki, *et al.*, *C. A.* **2**, 99). In the presence of some H_2O also $3,5,4-Br_2(HO)C_6H_2COPh$ (XI), m. 153.5°, is formed. IX and XI heated 6 days with KOH-EtOH were recovered unchanged. *4-Hydroxy-3'-bromobenzophenone*, m. 171°, was obtained by boiling $4,3'-EtOC_6H_4COC_6H_4Br$ in AcOH and HBr (d. 1.49); it is not attacked by KOH-EtOH. X heated with KOH + EtI gives *4-ethoxy-3-bromobenzophenone* (VII), m. 102.25°, also obtained by brominating I. VII + KOH-EtOH heated at 100° for 2 days and poured into H_2O sepd. *4-ethoxy-3-bromobenzohydrol*, m. 85°. XI treated like X gave *4-ethoxy-3,5-dibromobenzophenone* (III), b_{11} 244°, m. 83.5°. III treated like VII gave *4-ethoxy-3,5-dibromobenzohydrol*, m. 81.75°. $3-BrC_6H_4COCl + PhOEt + AlCl_3 + CS_2$ at 55° gave *4-ethoxy-3'-bromobenzophenone* (XII), b_{11} 232°, m. 79.5°. XII in EtOH boiled with Na-Hg, dild. with H_2O and evapd. gave *4-ethoxybenzohydrol*, m. 40.75°, thus proving the constitution of XII. Heated with KOH-EtOH 2 days XII gives *4-ethoxy-3'-bromobenzohydrol*, m. 43°. $4-H_2NC_6H_4COPh$ brominated in AcOH gave on adding H_2O slowly *4-amino-3,5-dibromobenzophenone*, m. 147.25° (Clarke, Esselen, *C. A.* **5**, 2810), which, treated in hot EtOH + H_2SO_4 with aq. $NaNO_2$, gave finally *3,5-dibromobenzophenone*, b_{13} 232°, m. 75°; this with KOH-EtOH gives *3,5-dibromobenzohydrol*, m. 75.5°. *4,4'-Diethoxybenzophenone*, (XIII) b_{15} 258°, m. 132°, was obtained from $4-EtOC_6H_4CO_2H$; with KOH-EtOH it gave some *4,4'-diethoxybenzohydrol*, m. 59°, as well as unchanged XIII. E. J. Witzemann

The development of chemistry and industry of naphthalene in recent years. H. E. Fierz-David. *Z. angew. Chem.* **36**, 188–90(1923). E. H.

Doubly refractive naphthalene. W. Kirby. *J. Soc. Chem. Ind.* **42**, 58T(1923).—Melting $C_{10}H_8$ in a suitable vessel and allowing it to cool results in the solidification on the sides of the vessel in a clear transparent mass which is double refractive. The resolving power is 30% greater than that of Iceland spar. W. H. Boynton

Spectrochemical peculiarities and constitution of naphthalene, anthracene, phenanthrene and fluorene. K. von Auwers and F. Krollpfeiffer. *Ann.* **430**, 230–68(1923); cf. K., *C. A.* **17**, 1228, 1460.—A large no. of spectrochem. measurements are collected and discussed from the point of view of their bearing on the constitution of the various basic ring systems. A. and K. favor structures for $C_{10}H_8$ and $C_{14}H_{10}$ in which only 1 ring has full aromatic character and the usually accepted structures for phenanthrene and fluorene. As regards the effect of substitution in $C_{10}H_8$ on spectrochem. properties, the conclusions are drawn that large increases in the sp. refraction run parallel with large dispersion; that the introduction of alkyl, alkoxyl, carbalkoxyl groups and halogens has but little effect on the exaltation of the refraction or dispersion; that the effect of halogens is greater than in derivs. of C_6H_6, and β-derivs. have as a rule a stronger exaltation in sp. refraction than the corresponding α-derivs. C. J. West

Interaction of formaldehyde and the nitronaphthylamines. G. T. Morgan and F. R. Jones. *J. Soc. Chem. Ind.* **42**, 92–7T(1923).—HCHO has been condensed in turn with all the known $O_2NC_{10}H_6NH_2$ with the object of investigating the effect of the orientation of substituent groups on the reactivity of the amine towards this aldehyde. $1,2-O_2N-(H_2N)C_{10}H_6$ and HCHO in AcOH give *methylenebis-1-nitro-β-naphthylamine*, m. 222–3°;

from hot AcOH it forms yellow needles, which are converted into red needles by crystg. from boiling AcOH, when heated with $CHCl_3$ or C_6H_6 or by soln. in boiling C_5H_5N. The red modification was readily converted to the yellow by boiling with glacial AcOH and cooling. 1,4-$H_2NC_{10}H_6NO_2$ and HCHO in cold glacial AcOH give *4,4'-dinitro-1,1'-diamino-2,2'-dinaphthylmethane*, yellow, m. 268-70° (decompn.); alk. β-$C_{10}H_7OH$ and the diazonium sulfate gave *4,4'-dinitro-2,2'-dinaphthylmethane-1,1'-bisazo-β-naphthol*, brownish red, m. 257–8° and giving deep blue solns. in alkalies or cold concd. H_2SO_4. 1,2-$H_2NC_{10}H_6NO_2$ gave *2,2'-dinitro-1,1'-diamino-4,4'-dinaphthylmethane*, golden yellow, m. 299–301° (decompn.). In alc. or glacial AcOH, HCHO and 2,5-$H_2NC_{10}H_6NO_2$ condense even in the cold to a mixt. of substances, which, boiled with mineral acid, in part regenerates the components and in part gives a dinaphthacridine. In the presence of HCl (1 mol. equiv.) is formed *5,5'-dinitro-2,2'-diamino-1,1'-dinaphthylmethane*, reddish brown, m. 233–5°, which is changed by 2–3 hrs. heating in contact with the HCl-EtOH into *5,5'-dinitrodinaphthacridine*, reddish brown, darkens 250°, decomps. above 290°. 2,8-$H_2NC_{10}H_6NO_2$ and HCHO in cold EtOH give *methylenebis-8-nitro-β-naphthylamine*, crimson, m. 178°. In the presence of HCl, small yields are obtained of *8,8'-dinitro-2,2'-diamino-1,1'-dinaphthylmethane*, golden yellow, m. 209–10° (decompn.). *Methylene-bis-8-nitro-α-naphthylamine*, chocolate-brown, changing to almost pure red at 143–5° and m. 161–2°. In AcOH *8,8'-dinitro-1,1'-diamino-4,4'-dinaphthylmethanetriformaldehyde*, pale yellow, m. 172–3°, results; repeated crystn. did not cause dissociation into its components. When heated in a dry tube or with dil. mineral acids, HCHO was evolved but the pure methane base was not obtained; the *azo compd.* with β-$C_{10}H_7OH$ is crimson and decomps. above 270°. 1,5-$H_2NC_{10}H_6OH$ and HCHO give rise to ill-defined and inseparable products. C. J. West

Preparation of β-naphthol-4-sulfonic acid. G. T. Morgan and Evelinе Jones. *J. Soc. Chem. Ind.* **42**, 97–8T(1923).—2,4-$C_{10}H_5(OH)SO_3H$ may be obtained as the Ba salt by heating 60 g. naphthalene-1-diazo-2-oxide-4-sulfonic acid with 900 g. abs. EtOH 21 hrs., and neutralizing with $BaCO_3$. The acid was characterized by the prepn. of the *β-naphthalene-1-azo deriv.*, dark red flakes with metallic luster; the *p-nitrobenzene-1-azo* deriv., dark red; and the *p-toluene-1-azo deriv.* These gave deep purple-red to bluish purple solns. in concd. H_2SO_4, and dyed wool and silk varying shades of red.
C. J. West

The influence of boric acid on some polyhydroxy derivatives of naphthalene and of anthraquinone. J. Böeseken with Misses K. C. Anema and M. A. J. Brevet. *Rec. trav. chim.* **41**, 778–83(1922).—In the 1st paper on the action of H_3BO_3 on org. compds. with several OH groups it was learned that *o*-diphenols increase the cond. of H_3BO_3 pronouncedly while their *m*- and *p*-isomers are without effect. Derivs. of C_6H_6 have been previously examd. Results with derivs. of $C_{10}H_8$ are here reported. Work was limited to 1,2- and 2,3-$C_{10}H_6(OH)_2$ (I and II) because other isomers did not promise results commensurate with the difficulty of prepn. The results obtained are summarized below, the change in cond. being given in Kohlrausch-Holborn units $\times 10^6$; II, *M*/200, 82; I, *M*/200, 17; *M*/64, 46; pyrocatechol, *M*/64, 100; *M*/32, 131; *cis*-tetrahydronaphthalene-1,2-diol, 0.09 and 0.05 *M*, 7.2 and 2.0, resp.: 2,3-deriv., 0.06 *M*, —2.9. If the effect is to be attributed to the electronegative character of the C_6H_6 rings the effect should be greater with I, then II and the others in the order given. The values do not decrease in this order, indicating that steric influences play an important role. These compds. fall into 2 groups. The positive effect was attributed to flexibility of the ring by B. and v. Giffen (*C. A.* **14**, 2472). Derx (*C. A.* **16**, 3081) showed that the phenomena observed can be explained if it is admitted that the angles between the valences are fixed (± 109.28°); the atoms of a 5-atomic ring are then not situated in a plane. Further on the basis of Sachse's calcns. (*Ber.* **23**, 1363(1890)) satd. cyclic mols. with 6 atoms can exist in 2 configurations of which one is rigid and the other flexible. D. assumes that there is an equil. between the 2 sorts of mols. and that the rigid form is unfavorable to forming complexes with H_3BO_3. B. (*C. A.* **16**, 906) admits that the various positions visualized by S. are occupied in succession and that these satd. rings are surfaces in space with undulatory and oscillatory movements. On the contrary the C_6H_6 ring is rigid and groups entering it are forced into one plane. In the tetrahydro derivs. above only the hydrogenated part is flexible. This influence of rigidity is a little greater in I than in II and for this reason the OH groups in II are a little more favorably situated with respect to H_3BO_3. E. J. Witzemann

Catalytic oxidation of anthracene to anthraquinone. C. E. Senseman and O. A. Nelson. *J. Ind. Eng. Chem.* **15**, 521–4(1923).—The anthracene was vaporized and mixed with air in an elec. heated glass carbureter attached to the elec. heated glass reaction tube by a ground-glass joint. At the other end of the tube there was attached

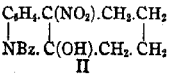
by a ground-glass joint a sublimer made from a 500-cc. Kjehldahl flask and serving to collect the anthraquinone. The highest yields (about 81% of theory) were obtained when the catalyst, V_2O_5, was fused on a glass tube, the temp. of the reaction tube was 410–25°, the rate of air flow 300 cc. per min., and the wt. of anthracene carried over about 0.3 g. per 1000 cc. of air. Pumice is the best support for the catalyst but the yields (about 59%) were not as great as when glass tubes and perforated disks (about 68%) were used. The V_2O_5 catalyst is more active when mixed with one or more of the lower oxides. The expts. indicate that the V_2O_5 is reduced to lower oxides by the anthracene and these lower oxides are then oxidized to V_2O_5 by O_2. G. W. STRATTON

Dinaphthanthracene series. V, VI. ERNST PHILIPPI AND REINHARD SEKA. *Monatsh.* **43**, 615–9, 621–31(1923); cf. *C. A.* **15**, 3837.—The action of $AlCl_3$ upon a mixt. of p-$C_6H_4Me_2$ and O:$(CO)_2$:C_6H_2:$(CO)_2$:O gives a mixt. m. 298°, of *1,5-di[p-xyloyl]benzene-2,4-dicarboxylic acid* and *1,4-di[p-xyloyl] benzene-2,5-dicarboxylic acid*, which was not sepd. but subjected to the action of concd. H_2SO_4 at 100° for 1.5 hrs., giving *1,4,8,11-tetramethyl-5,7,12,14-dinaphthanthracenediquinone*, darkens 340°, carbonizes at 385°. Oxidation with HNO_3 by heating in a sealed tube at 225–30° for 10 hrs. gave the corresponding *tetracarboxylic acid*, carbonizes about 325°. The $Na_2S_2O_4$ bath is bluish red, which changes to blue upon addn. of alkali. The reaction product of o-$C_6H_4Me_2$ with O:$(CO)_2$:C_6H_2:$(CO)_2$:O, like that of the p-deriv., is a mixt. but the action of concd. H_2SO_4 or of PCl_5 and $AlCl_3$ did not give satisfactory results. *1,4-Di-p-methoxybenzoylbenzene-2,5-dicarboxylic acid*, m. 311°. The more sol. isomer (in H_2O) is *1,5-di-p-methoxybenzoylbenzene-2,4-dicarboxylic acid*, m. 285°. Condensation with H_2SO_4 likewise was unsuccessful. The yield in the case of p-$C_6H_4(OMe)_2$ was very small. Condensation of C_6H_4:$(CO)_2C_6H_2$:$(CO)_2$:O with C_6H_6 using $AlCl_3$, followed by oxidation with CrO_3 gave 2-benzoylanthraquinone-3-carboxylic acid (*C. A.* **7**, 2211). Condensation by means of the Grignard reagent (PhMgBr) gave *anthracene-2,3-dicarboxylic acid-diphenylphthalide*, yellow, m. 260°. Upon oxidation with excess CrO_3 in AcOH, this gives the corresponding *anthraquinone deriv.*, yellow, m. 200°. Direct bromination of dinaphthanthracenediquinone yields as the principal product a *dibromo deriv.*, m. 363°. Direct nitration also gives a *dinitro deriv.*, darkens 380°, carbonizes about 400°. C. J. WEST

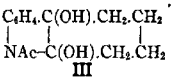
Furfural from corncobs. I. Factors influencing the furfural yield in the steam-digestion process. F. B. LAFORGE. *J. Ind. Eng. Chem.* **15**, 499–502(1923); cf. *C. A.* **16**, 94.—The most satisfactory conditions, from the standpoint of yield and cost, for producing furfural by this process are digestion of the cobs with H_2O in the ratio of about 1 to 4 for about 2 hrs., exclusive of the time required to raise the temp., at about 180°. Yields as high as 10%, based on the air-dried wt. of the cobs, were obtained. The theoretical content is about 20%. G. W. STRATTON

Derivatives of tetrahydrocarbazole. II. W. H. PERKIN, JR. AND S. G. P. PLANT. *J. Chem. Soc.* **123**, 676–95(1923); cf. *C. A.* **16**, 421.—In connection with the earlier study of the nitration of the Ac deriv., it became important to investigate the Bz deriv. Tetrahydrocarbazole (I) does not react with BzCl, but if it is 1st treated with EtMgBr (evolution of C_2H_6) and then with BzCl, the *benzoate*, m. 85°, is obtained. The action of HNO_3 gives the AcOH-sol. *5-nitro-9-benzoyl deriv.* of I; bright yellow, m. 140°, whose constitution was confirmed by hydrolysis to the 5-NO_2 deriv. of I; a 2nd product is *11-nitro-9-benzoyl-10-hydroxyhexahydrocarbazole* (II), m. 150° with evolution of N oxides (also by heating with AcOH). When II is boiled for 15 min. with dil. EtOH-KOH, *δ-o-benzoylaminobenzoylvaleric acid*, $BzNHC_6H_4CO(CH_2)_4CO_2H$, m. 126° results; *Na salt*. With an excess of aq. KOH *γ-4-hydroxy-2-phenylquinoline-3-butyric acid*, needles with 1 H_2O of crystn., lost rapidly at 160° and then m. 226°; and *δ-o-aminobenzoylvaleric acid*, yellow, m. 129°, are obtained. The presence of the NH_2 group was confirmed by the formation of a red dye. If HNO_3 acts on the Ac deriv. of I in the presence of much less AcOH than used in the 1st expt. about 80% of the reaction product is *9-acetyl-10,11-dihydroxyhexahydrocarbazole* (III), m. 204°; H_2SO_4 immediately colors it red and then gives a deep yellow soln. KOH in dil. alc. gives *11-hydroxytetrahydrocarbazolenine* (IV), orange, m. 79°. Aq. and alc. solns. have a striking fluorescence, the latter being destroyed by a drop of $FeCl_3$. *Acetate*, m. 113°. When III is heated with Ac_2O or alone at 225° for 30 sec., *acetyl-ψ-indoxylspirocyclopentane* (V), m. 204°, results. This may be hydrolyzed by dil. alc. KOH or by treatment with MeMgI and decompn. with dil. HCl, giving *ψ-indoxylspirocyclopentane* (VI), m. 112°. It does not react with MeI, EtI or Me_2SO_4 but is converted into V by Ac_2O. *9-Nitro deriv.*, formed quant. by dil. HNO_3, yellow brown, m. 229°. With excess Me_2SO_4, the *9-nitro-6-methyl deriv.*, m. 142°, results. HI does not split off Me. *Tetrahydrocarbazole-9-carboxylic acid*, obtained by the reaction of CO_2 upon the Mg deriv. of I, is very unstable; the *ethyl ester*.

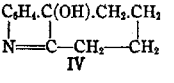
m. 65°, is quite stable and results by the action of $ClCO_2Et$ upon the Grignard reagent. The action of HNO_3 again results in 2 products; *Et 5-nitrotetrahydrocarbazole-9-carboxylate*, yellow, m. 116°, less sol. in AcOH, and *ethyl 10,11-dihydroxyhexahydrocarbazole-9-carboxylate*, m. 132–3°. Hydrolysis with aq. alc. KOH gives **IV**. *9-Phenylacetyltetrahydrocarbazole*, m. 86°, obtained in 35% yield. *5-Nitro deriv.*, yellow, m. 178°. *9-Phenylacetyl-10,11-dihydroxyhexahydrocarbazole*, m. 113°. Hydrolysis gave **VI**. Tetrahydrocarbazoles may be converted into carbazoles by heating the C_5H_7N soln. with the calcd. amt. of S, the yields being 15 to 30%. C. J. WEST



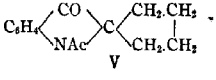
II



III



IV



V

The formation of ketazines, phenylhydrazones and semicarbazones of acetophenones substituted in the benzene ring. W. J. BRUINING. *Rec. trav. chim.* **41**, 655–86 (1922).—Janse (*C. A.* **15**, 3817) in a study of the action of CO reagents on ring-substituted derivs. of BzH found but little influence of this substitution upon their reactivity. B. has studied the action of N_2H_4, $PhNHNH_2$ and $NH_2CONHNH_2$ on 8 ring-substituted derivs. of MeCOPh. Since these derivs. were little sol. in EtOH they were dissolved in $EtOH-H_2O$ and boiled under a condenser with $N_2H_4.H_2SO_4$ in the presence or absence of KOAc in prepg. the ketazines, which were all yellow (unless otherwise stated) and were sol. in C_5H_5N and hot $PhCH_2OAc$, but not in H_2O, EtOH, Et_2O, petroleum ether, $CHCl_3$ and C_6H_6. The phenylhydrazones were obtained by adding the calcd. amt. of $PhNHNH_2$ to the CO deriv. in glacial AcOH or $AcOH-H_2O$ and allowing the soln. to stand a few hrs. at room temp. The semicarbazides were obtained by boiling the CO derivs. + $NH_2CONHNH_2$ in dil. EtOH and generally the calcd. amt. of KOAc. $4-H_2NC_6H_4COMe$ (I) was at first prepd. according to Klingel (Chattaway, *J. chem. Soc.* **85**, 341(1904)), but afterwards by a modified method. With $N_2H_4.H_2SO_4$ I gave the ketazine sulfate (Knöbfer, *C. A.* **3**, 1535), decomps. 235°, which with NH_4OH gave the free ketazine, m. 166°. The yellow phenylhydrazone of I m. 108–13° (*l. c.* K.). The semicarbazone-HCl of I m. 250°, while the free semicarbazone, m. 166–7° (not 250° as stated by K.). I acetylated by Blanksma's method (*C. A.* **4**, 752) gave $4-AcNHC_6H_4COMe$ (II), m. 171°, of which the *ketazine*, m. 311°, the *phenylhydrazone*, m. 196–200°, the *semicarbazone*, m. 220°. I with Br in glacial AcOH gave $3,5,4-Br_2(H_2N)C_6H_2COMe$ (II) (Fuchs, *C. A.* **9**, 1463), m. 180–1°, of which the *ketazine*, m. 297°, the *phenylhydrazone*, m. 140–3°, the *semicarbazone*, m. 255° (decompn.). On acetylation III gave *4-acetamino-3,5-dibromoacetophenone* (IV), m. 188–9°. IV on further acetylation gave *4-diacetamino-3,5-dibromoacetophenone* (V), sepg. at first from dry Et_2O in a metastable form, m 67°, which in several days passed over into the stable form, m. 88°. V gives a *ketazine*, m. 244–6° and a *semicarbazone*, decompg. 325°. A comparison of the above 12 ketone derivs. shows that the compd. contg. a free NH_2 group have a m. p. lower than those in which the group is acetylated. The compds. with 2 Br atoms (in 3 and 5) have a higher m. p. than the corresponding unbrominated MeCOPh derivs. The order of decreasing m. p. for any one MeCOPh deriv. is ketazine, semicarbazide, phenylhydrazone, with 1 exception. Powdered III in EtOH + concd. H_2SO_4 + powdered $NaNO_2$ heated on a H_2O bath under a condenser and then poured into H_2O gave *3,5-dibromoacetophenone* (VI), m. 65°; its *ketazine* m. 231°, *phenylhydrazone* m. 109–10° and *semicarbazone* m. 268° (decompn.). The prepn. of *3,4,5-tribromoacetophenone* (VII) from III gave difficulty. Since III is little sol. in HBr it was necessary to diazotize it in suspension, and part of it remains unattacked. Owing to the difficulty of sepg. VII and III the unchanged III was filtered out of the diazonium soln. and the soln. then poured into the $CuBr_2$ + HBr soln. The *ketazine* of VII, m. 300°, its *phenylhydrazone*, m. 129–34°, its *semicarbazone*, m. 265° (decompn.). VI in cold abs. HNO_3 poured on ice gave *3,5-dibromo-2-nitroacetophenone* (VIII), m. 133–44°; its *ketazine*, m. 210°, its *hydrazone* (IX), m. 165–6°, its *phenylhydrazone*, m. 170°, its *semicarbazone*, m. 120° (or with 1 mol. AcOH, m. 232°). IX was obtained when a double amt. of $N_2H_4.H_2SO_4$ was boiled with VIII in the prepn. of the ketazine. That it was IX was proved by boiling it with BzH in EtOH, which gave the mixed ketazine [*(methyl-3,5-dibromo-2-nitrophenyl]benzalazimethylene*), m. 127°. VII

(purified through the semicarbazone) in cold abs. HNO_3, poured on ice gave *3,4,5-tribromo-2-nitroacetophenone* (**X**), m. 188–9.5°, whose *ketazine*, m. 244°, *phenylhydrazone* m. 173–4° and *semicarbazone*, m. 249°. Additional proof of the constitution of **VIII** was obtained thus: To **VIII** in aq. alc. NH_4Cl was added Zn powder on the H_2O bath, the resulting solid filtered and extd. with boiling EtOH and the 2 filtrates poured into H_2O contg. a little HCl: *3,5-dibromo-C-methylanthranil* (**XI**) sepd. The **XI** was heated carefully in a dry tube until it again became solid, was extd. with boiling EtOH, dried and again heated to sublime the *5,5′,7,7′-tetrabromoindigo*, identical with that obtained, by Janse (*l. c.*) from 3,5,2-$Br_2(O_2N)C_6H_2CHO$; this, together with the other proof given dets. the constitution of **VIII**. *5,5′,6,6′,7,7′*-Hexabromoindigo (Janse, *l. c.*) was obtained similarly from **X**. Glacial AcOH is a solvent particularly suited for the prepn. of phenylhydrazones of ring-substituted acetophenones, probably because of its weak acid character. Closer examn. of the formation of ketazines of ring-substituted acetophenones showed that they are only formed under the influence of H^+ ions; they were easily obtained with $N_2H_4.H_2SO_4$ while they are not formed with N_2H_4 in boiling dil. EtOH. At high H-ion concns. the ketazines were again decompd. completely. The amts. of ketazines formed from **III**, **IV**, **VI**, **VII** and **VIII** under the conditions used increased in the order given when $N_2H_4.H_2SO_4$ was used. Differences in the velocity of formation as well as in the point of equil., at which the ketazine decomps. as fast as it is formed, were observed. The formation of semicarbazone is most rapid in alk. or neutral soln. In this reaction **III** also reacts more difficultly than the other substituted acetophenones. The semicarbazones are also decompd. into their constituents by an excess of acid. This property was used to purify **VII**. In **VIII** and **X** the NO_2 in the *o*-position exercises an inhibiting influence on the reactivity of the CO group, as proved by the slowness of formation of the ketazines and by the fact that the semicarbazones are not formed at all by boiling **VIII** and **X** in EtOH with $NH_2CONHNH_2$.HCl + KOAc, but are formed by boiling them with $NH_2CONHNH_2$ in dil. EtOH soln. The view of Curtius (*J. prakt. chem.* [2] **44**, 161(1891)) that the products of condensation of N_2H_4 and ketones are decompd. by acids in the cold does not hold true for the ketazines of substituted acetophenones. Of the hydrazones only that of **VIII** was obtained pure.

E. J. Witzemann

Bromo derivatives of 4-methylglyoxaline. Frank Lee Pyman and Geoffrey Millward Timmis. *J. Chem. Soc.* **123**, 494–503(1923).—The bromination of Et 4-methylglyoxaline-5-carboxylate gives a 52% yield of *Et 2-bromo-4-methylglyoxaline-5-carboxylate*, m. 152–3°, sol. in about 36 parts boiling H_2O and 275 parts cold H_2O. Hydrolysis gives the *2-bromo acid*, m. and decomps. 234° (previously heated at 220°). This acid, heated with 10 parts H_2O 3.5 hrs. at 150°, yields *2-bromo-4-methylglyoxaline* (I), m. 124–5° (cor.) sol. in about 15 parts boiling H_2O; *picrate*, primrose-yellow, m. 172–3° (cor.). Since this is not identical with the Br deriv. described before (*C. A.* **5**, 79), the earlier deriv. must be 5-bromo-4-methylglyoxaline. Reduction of I with Na_2SO_3 gave 75% yields of 4-methylglyoxaline. Bromination gave the 2,5-Br_2 deriv. Nitration gave the 5-NO_2 deriv. (Windaus, *C. A.* **3**, 1268), which m. 220–1°, solidifies and then decomps. about 240°. It is sol. in about 35 parts hot or 300 parts cold H_2O, Me_2SO_4 gave *2-bromo-5-nitro-1,4-dimethylglyoxaline*, b_{10} 162°, m. 67–8°; *hydrochloride*, m. and decomps. 187°. Na_2SO_3 gives *5-nitro-1,4-dimethylglyoxaline-2-sulfonic acid*, contg. 0.5 H_2O m. and decomps. 293°. *2-Bromo-4-nitro-1,5-dimethylglyoxaline*, b_{10} 227°, m. 179–80°; it is sol. in about 100 parts boiling and 1000 parts cold H_2O. The Br derivs. can be distd. unchanged under 10 mm. approx. at the following temp.: *5-bromo-1,4-dimethylglyoxaline*, 168°; 2,5-Br_2 deriv., 130°; 4-bromo-1,5-dimethylglyoxaline, 160°; 2,4-Br_2 deriv., 175°. The following conclusions are reached from these and earlier results. In the case of glyoxalines contg. a free NH group, a Br atom in the 2-position is readily replaced by H and 1 of 2 Br atoms situated in the 4- and 5-positions with less readiness; a single Br atom in the 4-position is stable to Na_2SO_3 in 4-bromoglyoxaline or 4-bromo-2-methylglyoxaline but is capable of replacement by H when a Me group occupies the 5-position. In *N*-methylglyoxalines Br atoms in the 2-position are much less readily replaced by H; halogen atoms in the 2-position readily suffer the replacement of halogen by the SO_3H residue when the 5-position is occupied by a group of strong positive polarity.

C. J. West

Bromination of glyoxaline-4-carboxanilide. Harold King and Wm. O. Murch. *J. Chem. Soc.* **123**, 621–9(1923).—The object of this investigation was the prepn. of 4-bromoglyoxaline-5-carboxylic acid (I) with the view of synthesizing xanthine by condensation of the ester with $CO(NH_2)_2$. The acid was obtained but the small yields have prevented attempts at the condensation. Two mols. Br react with glyoxaline-4-carboxanilide in glacial AcOH, giving a mixt. of mono-, di- and tri-Br derivs. This is

extd. with H_2O on the boiling H_2O bath. The aq. soln. deposits *glyoxaline-4-carbox-p-bromoanilide*, crystg. from AcOH with 2 AcOH of crystn., lost at 100° and then m. 273–4°. Hydrolysis gives **I.** *5-Bromoglyoxaline-4-carbox-p-bromoanilide* (II), m. 245–6°, is then extd. with very dil. HCl. The residue is the *2,5-dibromo* deriv. (III), $C_{10}H_8ON_3Br_3$, which crysts. with 1 $C_2H_4O_2$, and m. 257–8° (decompn.). Hydrolysis of III with HCl (sealed tube at 150° for 3 hrs.) gave *p*-$BrC_6H_4NH_2$, and a mixt. contg. about 95% dichloro- and 5% dibromoglyoxaline, m. 184–5°. Hydrolysis of III with HBr gave a mixt. of the 2,5-Br_2 deriv. and *2-bromoglyoxaline*, m. 207°; Pauly's reagent gives a deep orange color; *picrate*, yellow, m. 232° (decompn.); *nitrate*, decomps. violently 137°. *2,5-Dibromoglyoxaline nitrate-silver nitrate*, $2C_5H_2N_2Br_2.AgNO_3.HNO_3$. II is sol. in about 6 parts boiling AcOH. It is mixed with a very small amt. of a compd. contg. about 50% Br and m. 247°. Hydrolysis of II with 24% HBr gives *p*-$BrC_6H_4NH_2$ and *5-bromoglyoxaline-4-carboxylic acid*, m. 265°, sol. in 50 parts boiling H_2O, and forms a *hydrochloride*, *nitrate*, *Ag salt*, and gives a deep orange color with Pauly's reagent. *Et ester*, m. 170–1°. With 30% HBr some 4-bromoglyoxaline was also isolated. Bromination of II gave III with some of the compd. m. 247°. C. J. WEST

Formation of quaternary ammonium salts. I. E. DE B. BARNETT, J. W. COOK AND E. P. DRISCOLL. *J. Chem. Soc.* **123**, 503–18(1923).—Three groups of compds. are capable of direct quaternary salt formation by treatment with C_5H_5N and a halogen: Those contg. a H atom which is readily replaceable by a halogen atom; unsatd. compds., though this reaction does not seem to be confined to those in which the double bond lies between 2 C atoms; and those compds. contg. the quinonoid group, which class is treated in this paper. Quinolpyridinium bromide (Ortoleva, *Gazz chim. ital.* **31**, II, 256; **32**, I, 447), m. 234–5°, not 230°; NH_3 gives a deep red color but a betaine could not be isolated. *Picrate*, orange-yellow, m. 197–9°; *perbromide*. *1,4-Diacetylphenylpyridinium iodide*, by heating the iodide with Ac_2O in C_5H_5N, yellow, darkens 160°, m. 177–83°. *2-Bromoquinol-3-pyridinium bromide*, straw-colored, decomps. 270–2°. *2,5-Dinitroquinolpyridinium bromide*, yellowish brown, decomps. without m. *Chloride*, bright yellow, decomps. 205°. Boiling with H_2O gives the *nitrolbetaine*, $C_{11}H_7O_6N_3$, does not m. and is somewhat explosive. It dissolves in dil. acids to form the corresponding salts: Ac_2O in C_5H_5N apparently gave a mono-Ac deriv. but it could not be purified. *Catecholpyridinium bromide*, m. 267–8°. *Picrate*, lemon-yellow, m. 202–3°. Dissolved in hot H_2O and treated with NH_3, the bromide gave a betaine, $C_{11}H_9O_3N.2H_2O$, orange, decomps. 130–40°. The iodide, heated with Ac_2O, gave *1,2-diacetoxyphenylpyridinium iodide*, pale yellow, m. 201–4°. *1,2-Naphthoquinone-3(4)-pyridinium bromide*, orange-brown, m. 201° (decompn.). Its solns. liberate I from HI and give an intense purple color with NaOH, and, when acidified, a red gelatinous ppt. It is easily reduced by H_2SO_3. If Br is added to $C_{10}H_6O_2$ in $CHCl_3$ 0.5 hr. before the C_5H_5N is added, the *3(4)-bromo deriv.* is obtained, orange, m. 244° (decompn.). *3(4)-Bromo-1,2-dihydroxynaphthalene-4(3)-pyridinium bromide*, formed if 1 mol. Br is used in place of 2, yellowish brown, m. 217–20°. *Picrate*, lemon-yellow, m. 197–200°. *1,4-Dihydroxynaphthalene-3-pyridinium bromide*, brown, m. 214–6° (decompn.). $(HOC_6H_4)_2$ in C_5H_5N, treated with 5 mols. Br, forms *3,3'-dibromo-4,4'-dihydroxydiphenyl-5,5'-dipyridinium dibromide*, straw-colored, m. 325° (decompn.). The aq. soln. becomes bright orange-red on addn. of NH_3 or alkali. These colors may in part be due to betaine formation but it is also probable that the C_5H_5N ring opens, forming a deriv. of glutaconaldehyde. C. J. WEST

***p*-Nitrobenzylpyridinium salts.** H. H. GRAINGER. *Chem. News* **126**, 182–3 (1923).—*p-Nitrobenzylpyridinium chloride*, from the components, m. 208° (decompn.). *Bromide*, m. 222°. *Picrate*, yellow, m. 172°. When it was reduced with Sn and HCl, diazotized and coupled with β-$C_{10}H_7OH$, Me_2NPh and R-salt, very sol. red basic dyes which were too unstable for technical use were obtained. C. J. WEST

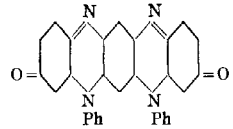
Catalytic hydrogenation under pressure in the presence of nickel salts. IV. Quinoline bases. JULIUS V. BRAUN, ADOLF PETZOLD AND JON SEEMAN. *Ber.* **55B**, 3779–92(1922).—The Schröter method (*C. A.* **16**, 1763, 4200), for $C_{10}H_8$ was considered applicable to quinoline (I) and its derivs. from 2 viewpoints: (1) A smooth hydrogenation of the N-contg. nucleus seemed likely, and larger-scale operation would make a series of hydrogenated I bases more available than formerly. (2) The catalytic hydrogenation of the I structure might introduce 4 atoms of H into the C_6H_6 nucleus, at least partly. To obtain such bases, the simplest of which is the *bs*-tetrahydroquinoline (II), was desired because they are not only a new type of C_5H_5N derivs., but also because recent work at the Univ. of Frankfurt shows they are probable constituents of tar bases. I is converted under rather moderate conditions (about 20 atm. H_2 pressure and 210–5°) completely into *py*-tetrahydroquinoline (III), a quick, simple process.

From about 250° up the III remains largely as such, partly reduces to decahydroquinoline and partly changes to a mixt. of tert. $C_9H_{15}N$ bases, apparently quite varied and not yet sepd. into its components. Expts. with I derivs., substituted in the C_6H_6 or C_5H_5N nucleus were successfully carried out from the first view-point and especially from the second. With a substituted C_6H_5 nucleus or a C_5H_4N nucleus with an α-substituent, the reduction goes as with **I.** 6-Methyl- (IV), 6-chloro- (V), 6,7-ethylenedioxy- (VI) and 2-phenylquinoline (VII) change to the corresponding sec. tetrahydro derivs., partly at much lower temps. than does **I,** with greater ease and mostly quant., making the compds. more available in large amts., especially the reduction product of **V,** which, when prepd. by the action of metals and acids, readily loses its halogen partly, making it difficult to isolate pure (*C. A.* **11,** 806). With the C_6H_5N nucleus substituted in the β-(3)-position, as in *3-ethyl-* (VIII), *3-amyl-* (IX) *and 3-phenylquinoline* (X), the C_6H_6 nucleus takes on H. Of **X** only ⅔ is changed into the sec. β-phenyltetrahydroquinoline, ⅓ into the isomeric tert. *β-phenyl-bz-tetrahydroquinoline (3-phenyl-5,6-tetramethylenepyridine)* (XI); about 33% of VIII gives the β-Et *analog* (XII) of XI; and IX gives about 50% of the *β-Am analog* (XIII). The existence of the C_5H_5N structure was shown in two ways. XIII was changed to $2,3,5\text{-}C_5H_2N(CO_2H)_3$ (XIV) by oxidation, and XI was changed to *β-phenyldecahydroquinoline* (XV) by the action of Na and alc. (a known process for C_6H_5N bases). From the expts. already made it may be said that this hydrogenation method will give numerous members of the tetrahydroquinoline series and widen the field of C_6H_5N derivs. in an unexpected manner. The following reductions were made partly with pure bases, partly with solns. in indifferent solvents (tetralin or decalin), with identical results in both cases while the diln. does not noticeably affect the speed of H addn. Com. prepns. of synthetic I can sometimes be hydrogenated without purification with Ni salts under pressure. After a single purification of the base through the sulfate in alc. the hydrogenation is effective, usually at 210–5°, and so rapid that 200 g. is reduced in 60–70 mins. Reduction is slower after addn. of 4H. The product b. 245° and was identified as pure III, yield quant. IV absorbs 4 H at 120° very quickly, giving a product (90% of theory) $C_{10}H_{13}N$, b_9 131–3°, solidifies quickly, m. 37–8°; the quaternary methiodide m. 224° (*C. A.* **10,** 1528). V takes on H at 160°, the hydrogenation is slower than with I and IV, the reduction of 50 g. requiring 1 hr. The product *6-chloro-py-tetrahydroquinoline,* b_{18} 155°, m. 43°. The *HCl salt,* m. 190°, the yellow *picrate,* m. 150°, the yellow *NO compd.,* m. 67°. VI was prepd. some time ago by Sonn and Benirschke (*C. A.* **16,** 562), from 4-aminopyrocatechol by Skraup's method. By reduction with Sn and HCl they obtained a tetrahydro compd., not pure, as its m. p. (not sharp) was lower (78°) than for the corresponding quinoline (97°), while the contrary is usually true of quinolines substituted in the C_6H_6 nucleus. Catalytic reduction of VI, m. 102°, gives a different result. It takes up H very quickly at 180–190°, 70 g. being hydrogenated in 1 hr. Upon cooling there was found in the autoclave a solid which quite uniformly b_{11} 193°, solidifies very soon in the receiver to a snow-white cryst. mass, and m. 101° after purification from alc. The yield (not stated by Sonn and B.) was 90%. The substance is not at all hygroscopic, contrary to S. and B., and takes on color in the air only slowly; the *picrate,* m. 168°; *HCl salt,* m. 199° (S. and B., 201°). The *NO compd.* obtained almost quant. (proof of the purity of the base), ppts. in acid soln. and m. 110°. VII, m. 86°, can be easily prepd. from the $4\text{-}CO_2H$ acid by splitting out CO_2 at 150°, the best hydrogenation temp.; 100 g. of base are reduced quant. in about 1.5 hrs. to the completely pure *py*-tetrahydro compd. (*Ber.* **19,** 1198(1886)), b_{12} 196–7°. VIII was prepd. from $o\text{-}H_2NC_6H_4CHO$ and PrCHO in mol. proportions, similar to the prepn. of 3-methylquinoline (Freund and Richard, *C. A.* **3,** 2128), a method which makes easily accessible the long series of β-alkylquinolines which have now become important. The best conditions must be detd. for each individual case, however; for PrCHO action for 24 hrs. at 120–30° is best. The contents of the tube, a brownish, liquid contg. drops of water, dissolve clear in dil. acid and after making alk., extg. with Et_2O, drying and removing the Et_2O, give VIII, b_{12} 135–8°, an almost colorless oil with a quinoline-like odor, d_4^{20} 1.0508, n_D^{18} 1.603 (yield about 80%); *HCl salt,* 173°; *picrate,* 197°; *methiodide,* m. 191°. At the best hydrogenation temp. for VIII, 180–90°, about 45 g. adds 4 atoms of H in 1 hr. After that H addn. stops. The product lacks a sharp b. p. A small part b_{14} 90–115°, a larger part at 130°, the main portion 130–42°. When the oil is treated with BzCl and alkali, extn. with dil. acid shows that 33% is not attacked by the BzCl. After liberation with alkali the XII, $C_{11}H_{15}N$, b_{12} 125–8°, has only a weak odor, d_4^{20} 0.99218, n_D^{18} 1.5311; its tert. nature is shown by its indifference toward BzCl and Ac_2O, and by its union with only 1 mol. of MeI. The faintly yellow, *methiodide,* m. 120°. *Picrate,* yellow, m. 158°. The portion of the hydrogenation product which reacts with BzCl is liberated from the Ba compd. through 3 hrs.' heating

with concd. HCl at 120°; it is the *py-tetrahydro isomer* (**XVI**) of **XII**, b_{12} about 140°, distinguished from **XII** by an odor more like **I**, a somewhat greater d (d_4^{20} 1.0041) and refractive index (n_D^{19} 1.5625), and the presence of the hydrogenated C_5H_5N ring with sec. N; with HNO_2 it instantly forms a yellow oily *NO compd.*, insol. in H_2O; by exhaustive methylation with MeI and alkali is obtained an aq. soln. clear when hot, which on cooling deposits a *methiodide*, $C_{18}H_{30}NI$, richer by two C atoms, m. 205°. The *HCl salt* of **XVI**, m. 210°; the *picrate*, m. 142°; *o*-$H_2NC_6H_4CHO$ and enanthole heated in mol. proportions in a tube for 5 hrs. at 180°, gave a dark mobile oil mixed with drops of water, almost completely sol. in dil. HCl, from which, by extg. with Et_2O and making alk., there was obtained almost quant. pure **IX**, b_{16} 179°, d_4^{17} 1.1148, n_D^{17} 1.5715. The *HCl salt*, m. 174°; *picrate*, m. 153°; the yellow *methiodide*, which crysts. with difficulty and is obtained solid only by cooling its very concd. alc. soln. to 15°, m. 69°. **IX** takes up H quickly at 180–90°; the product b_{13} 160–80° after a trace of forerun, and is sepd. by BzCl into a tert. base and an isomeric sec. base uniting with BzCl. The latter *3-amyl-py-tetrahydroquinoline* (just 50% of the original mixt.), recovered by hydrolysis with HCl in a tube at 130°, has a weak quinoline odor, b_{12} 159–64°, d_4^{17} 0.96625, n_D^{17} 1.5339, very reactive with Ac_2O, giving an oily Ac compd. like the Bz compd. and an oily nitrosamine; by exhaustive methylation with MeI and alkali in H_2O there is obtained a *methiodide*, $C_{16}H_{26}NI$, 145°. The *HCl salt*, m. 124°; the *picrate* is an oil. The isomeric tert. base (**XIII**) is obtained in considerably greater yield (over 50%) than in the Et series. It b_{12} 167°, is almost odorless, d_4^{17} 0.9628, n_D^{17} 1.5188, is non-reactive with Ac_2O and HNO_2 and with 1 mol. of MeI forms a *methiodide*, m. 105°; the *HCl* and *H_2PtCl_6 salts* are oily; the *picrate*, m. 135°. **XIII** suspended in H_2O is oxidized by $KMnO_4$ only at the water bath temp. and rather slowly. With the theoretical amt. of $KMnO_4$ for oxidation of the tetramethylene and Am groups considerable $H_2C_2O_4$ is formed and it was advantageous to use less than this amt., 10 g. $KMnO_4$ instead of 13 g. to 1 g. of base, added in small amts. as used up. After completion of the oxidation (6 hrs. for 2 g. **XIII**) filter off the MnO_2, evap., neutralize with AcOH, add cold satd. $Cu(OAc)_2$, filter off the ppt. of Cu salt after 12 hrs., wash, suspend in hot H_2O, treat with H_2S, evap. the filtrate, purify the pptd. acid through the Cu salt again. From the concd. soln. were obtained globular aggregates characteristic for 2,3,5-$C_5H_2N(CO_2H)_3$, m. 320–30° (according to the speed of heating) with evolution of CO_2, contains 1.5 mols. H_2O of crystn. after drying over H_2SO_4 (Weber, *Ann.* **241**, 1(1887); *Ber.* **21**, 2707(1888)). The acid gave the very characteristic red color with Fe salts. **X**, first obtained by Friedländer and Göhring (*Ber.* **16**, 1883(1883)) from *o*-$H_2NC_6H_4CHO$ and $PhCH_2CHO$ by condensation with NaOH, was described as a colorless oil solid at low temps. Hübner obtained it from phenylcinchoninic acid in crystals, m. 52° (*C. A.* **2**, 1450), and characterized it by a series of salts. The authors found that by F. and G.'s process, dissolving the base obtained in Et_2O, drying and distg., it b_{12} 205–7°, undecompd., and solidifies without residue to a cryst. mass, which showed the m. p. assigned by H. to **X**. The salts agreed completely with H.'s description. The hydrogenation at 160° went very quickly, 100 g. in not quite 0.5 hr. The reduction product obtained b_{12} 202–4°, almost the same as the material started with, but is richer by 4 atoms of H, as shown by analysis, and is a mixt. only partly solidifying upon cooling. The isolation of **XI** is especially simple; by digestion of the entire base with cold alc. is obtained a difficultly sol. component as a completely solid cryst. mass, m. 83°, of *3-phenyl-py-tetrahydroquinoline* (**XVII**). The *HCl salt*, m. 229°; *picrate*, m. 181°; *picrolonate*, yellow, m. 205°; *Ac compd.*, m. 78°; *NO compd.*, m. 147°. The filtrate from **XVII**, acidified and treated with $NaNO_2$, ppts. the part of the sec. base dissolved by the alc. as a NO compd. (together with the **XI** sepg. directly, $^2/_3$ of the **X** used). On making alk. and shaking with Et_2O the filtrate gives **XI**, which, unlike the sec. base, is liquid, b_{18} 211–2°, miscible with alc., of weak odor. The *HCl salt*, becomes discolored at 225–50°, m. 235°. A mixt. with the salt of the sec. base m. 184–7°. The yellow *picrolonate*, m. 201° the mixt. with the picrolonate of **XVII** m. 185–95°. **XI** reacts neither with HNO_2 nor Ac_2O, unites with only 1 mol. of MeI, rapidly forming a *methiodide*, m. 240–3°. **XI** reduced with 2 parts of Na in anhyd. alc. gives after the usual treatment of the reaction a base, b_{16} 188–95°, solidifying to a cryst. mass impregnated with oil; pressed upon clay, and digested with a little ice-cold petroleum ether it give **XV**, m. 98°, sintering somewhat about 95°. It reacts vigorously with Ac_2O, but the Ac compd. was not obtained solid. The NO compd. ppts. at once in acid soln. as an oil which solidifies after soln. in a little Et_2O and addn. of petroleum ether and m. 110° after two such treatments. The picrate, m. 210–2°. J. B.

Fluorindinium salts. F. Kehrmann and Peter Leuzinger. *Helvetica Chim.*

Acta **6**, 239–48(1923); cf. Ger. pat. 142,565.—Practically only **isodiphenylfluorindinel** (I) results by condensing 1 mol. *o*-$H_2NC_6H_4NHPh$ with hydroxyaposafranone-HC, in BzOH as a solvent. *Methyldiphenylfluorindinium perchlorate,* bronze needles results by heating diphenylfluorindine with Me_2SO_4 in $PhNO_2$ at 125–30° and then adding $HClO_4$. An excess of $HClO_4$ gives the *diperchlorate,* glistening needles. The soln. in concd. H_2SO_4 is greenish blue with a strong red fluorescence. Neutralized with alkali, the color is changed to pure blue and the fluorescence disappears. Heated with alkali, the soln. becomes violet-red, because of the splitting off of the Me group. *Ethyldiphenylfluorindinium diperchlorate,* reddish violet leaflets with metallic luster; the greenish blue soln. in concd. H_2SO_4 has a marked dark-red fluorescence. *Methylisodiphenylfluorindinium perchlorate; diperchlorate. Ethylisodiphenylfluorindinium diperchlorate,* bronze luster. No more than 1 alkyl group could be introduced. Oxidation with CrO_3 of I gave a *flourindinone compd.* isolated as the *perchlorate* greenish needles, with a bitter taste and giving in concd. H_2SO_4 a yellowish green soln. changing to violet-red upon addn. of H_2O. $SnCl_2$ gives a greenish blue soln. in EtOH, probably due to the reduction of an HO deriv. *Chloroplatinate,* greenish gray powder with metallic luster. C. J. West



General method of preparation of the iodobismuthates of the alkaloids in crystalline form. Maurice François and L. G. Blanc. *Bull. soc. chim.* **33**, 333–41(1923).—See *C. A.* **16**, 3663. E. H.

Crystal form of some organic arsenic compounds (Gilta) **2.** Recent ideas on the structure of sugar (Colin) **28.**

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Dehydrating isopropyl alcohol. M. D. Mann, Jr. U. S. 1,452,206, Apr. 17. Isopropyl alc. is mixed with caustic alkali and the aq. soln. which forms is sepd. after stratification from the dehydrated isopropyl alc.

***N*-Dihydro-1,2,1′,2′-anthraquinoneazine.** W. J. Pope. U. S. 1,451,270, Apr. 10. 2-Aminoanthraquinone is treated with fused KOH in the presence of KOAc or K formate or other org. salt miscible with the fusion material and the reaction product is oxidized, *e. g.*, by air, to produce *N*-dihydro-1,2,1′,2′-anthraquinoneazine.

α-Naphthylamine. S. P. Miller. U. S. 1,451,666, Apr. 10. $C_{10}H_8$ is nitrated and the nitro product is reduced with Fe and an acid, solvent naphtha is added to dissolve the α-naphthylamine and the soln. is filtered and distd.

2-Naphthol-3-carboxylic acid. E. C. Shorey. U. S. 1,450,990, Apr. 10. Na β-naphtholate is subjected to the action of CO_2 under pressure and the reaction mixt. is heated; gas carrying β-naphthol is withdrawn from the reaction mixt. and CO_2 free from β-naphthol is supplied to the reaction mixt. during the heating to remove β-naphthol *via* a recovery condenser.

Dihydroxyperylene and perylene. A. Zinke and A. Klingler. Can. 229,599, Mar. 13, 1923. Dinaphthols are heated with a ring-closing condensing agent such as chlorides of Al, Zn, Fe, etc., to a temp. not exceeding 170° for about one hr. to produce dihydroxyperylene. The reactions may be facilitated by the addn. of an alkali carbonate. The product may be reduced to perylene by heating it with a powd. metal such as Zn dust and $CaCl_2$ to 450° to 500°. Cf. *C. A.* **16**, 721.

Trichloro-*tert*-butyl nitrobenzoate. T. B. ALDRICH. U. S. 1,451,357, Apr. 10. Trichloro-*tert*-butyl nitrobenzoate is prepd. by heating together trichloro-*tert*-butyl alc. and *m*-nitrobenzoyl chloride. It crystallizes from alc. as white plates, m. 86–88°, is readily sol. in hot alc., very sol. in $CHCl_3$, acetone and ether, insol. in H_2O. contg. about 36% Cl.

1,4-Naphtholsulfonic acid. J. BADDILEY, J. B. PAYMAN and E. G. BAINBRIDGE. U. S. 1,452,481, Apr. 17. α-Naphthol is reacted on with chlorosulfonic acid in the presence of an inert solvent such as $C_2H_2Cl_4$.

Azoxy, azo, hydrazo and amino compounds. O. W. BROWN and C. O. HENKE. U. S. 1,451,489, Apr. 10. In the production of azo-, azoxy- and hydrazo-benzene from $PhNO_2$, or in the production of other azoxy, azo, hydrazo, or amino compds. from nitro compds., the latter, *e. g.*, the $PhNO_2$ in a gaseous state is mixed with H alone or other gas contg. H in the presence of a heated catalyst, *e. g.*, the reduction product of Pb_2O_4 and H.

Segregating olefins. L. C. STEWART. U. S. 1,452,322, Apr. 17. Gases contg. olefins such as result from cracking kerosene (oil gas) are brought into contact with a cold petroleum oil capable of absorbing propylene and the higher members of the olefin series in preference to ethylene to effect their sepn. from the latter. A suitable solvent for this purpose is kerosene.

Ethylidene diacetate. M. J. MARSHALL and G. S. SHAW. U. S. 1,450,982, Apr. 10. A reaction mixt. contg. ethylidene diacetate, HOAc and H_2SO_4 or other inorg. acid is treated with sufficient anhyd. NaOAc to fix and ppt. the inorg. acid preparatory to distn., to avoid decompn. of the diacetate.

Condensation product of acetaldehyde. H. W. MATHESON. U. S. 1,450,984, Apr. 10. About 0.5% of NaOH in aq. soln. is added to AcH to form condensation products contg. more than 2 mols., at a low temp.

Aldehyde-ammonia. H. W. MATHESON. U. S. 1,450,983, Apr. 10. See Can. 223,596 (*C. A.* **16**, 3904).

11—BIOLOGICAL CHEMISTRY

PAUL E. HOWE

A—GENERAL

FRANK P. UNDERHILL

A new sulfur-containing amino acid isolated from casein. J. H. MUELLER. *Proc. Soc. Exptl. Biol. Med.* **19**, 161–3(1921).—Casein was hydrolyzed with H_2SO_4, neutralized with Na_2CO_3, pptd. with $HgSO_4$ soln.; from the washed ppt. freed from electrolytes, a second ppt. occurred with $HgSO_4$ soln.; the S compd. remained in the filtrate. This was further purified by Ag_2SO_4 and $Ba(OH)_2$, and the compd. obtained from the Ag- and Ba-free filtrate by fractional crystn., and finally from dil. acetone. The substance appears as white plates or rosettes of indefinite cryst. form. The formula is $C_{11}H_{22}SN_2O_4$; the N is in the form of an amino group; the S is not in the lead blackening form. It was not definitely detd. that the S was not introduced into the mol. during prepn. The yield was 10 g. from 30 lbs. of com. casein. C. V. B.

The lipolytic power of the lungs. E. L. ZAAYER. *Arch. néerland. physiol.* **8**, 184–6(1923).—The lungs of dogs or cats, taken immediately after death, are washed and divided into 2 equal parts. The first half is heated to 110° (to destroy all enzymes); the second half is kept at 38° for 18 hrs. (to let the lipolytic enzymes act). Both halves are dried, ground, and extd. with alc. and, after that, with ether. The exts. are weighed. In all cases the second half yields less ext., owing to the action of the lipolytic enzymes, the difference varying from 1 to 5 g. with a total wt. of ext. from 13 to 18 g. R. BEUTNER

Proteolysis. G. CHABOT. *Bull. soc. chim. Belg.* **41**, 193–204(1922).—*Proteolysis of green malt in a concn. of 20% is studied at various temps. and under different conditions.* This material (the same as that used in the manuf. of yeast by the aeration method) contains about 10% protein and is rich in enzymes. To exclude bacterial action 0.25% NaF is added. The intensity of proteolysis is detd.: (1) by detg. the total N of the malt before proteolysis, and (2) by detg. before and after proteolysis the amino-acid N by the method of Sörensen (titration by means of formol). NaF has no considerable effect on proteolysis at 17°. At 35° it slightly inhibits and at 50° it facilitates proteolysis. At 45° (the optimum temp. for peptonization) 25.17% of the total N was changed

into amino-acid N within 4 hrs. If no NaF is added the optimum temp. is 35° If the enzymic action is extended for more than 15 hrs. the increase of amino acids formed is but small. The optimum reaction of the medium is obtained by neutralizing about ¾ of the total alky. of the malt with H_2SO_4; 0.2 g. H_2SO_4 must be added per 100 g. malt for this purpose. If more H_2SO_4 is added the increase of H ions decreases the proteolytic action. Also, the addn. of OH in small concns. has a paralyzing influence.
R. BEUTNER

Action of some metals on the activity of yeast in egg albumin solution. G. B. ZANDA. *Arch. ital. biol.* **71**, 133–42(1922).—Yeast fermentation develops better in egg albumin soln. than in distd. or drinking H_2O, and develops equally well in unstirred egg albumin, and that beaten up with powd. quartz. Stirring finely powd. metals with egg albumin fixes them in an undetd. chem. combination. Such solns. affect the fermentation. Pb accelerates and augments it; Fe and Zn augment; Cu and Sb retard and diminish it.
A. T. CAMERON

The progress of tryptic digestion of protein as studied by the method of butyl alcohol extraction. A. HUNTER. *Trans. Roy. Soc. Canada* **16**, Sect. V, 71–4(1922).—The fraction contg. monamino-monocarboxylic acids steadily increases with the process of digestion (of 10% Na caseinate). About 20% N of the digestion product is in combinations sol. in BuOH and EtOH. This mixt. contains a little tryptophan and tyrosine, but is chiefly not free amino acids; most of it is pptd. by phosphotungstic acid. For the most part it is a real product of tryptic digestion, and is not formed by condensation.
A. T. CAMERON

Action of arginase and its possible use in the determination of arginine. A. HUNTER AND J. A. MORRELL. *Trans. Roy. Soc. Canada* **16**, Sect. V, 75–7(1922).—Pure arginine prepd. from gelatin has $[\alpha]_D^{20} = +26.54°$. Decompd. by arginase, urea N was 98.2% of the theoretical yield. Study of H-ion effect showed max. decompn. at p_H 7, increased acidity sharply decreasing the action. The max. velocity of action is at about 50°. At 70° the enzyme is practically inactive.
A. T. CAMERON

Question of the presence of the tryptophan radical in the molecule of hemoglobin. A. HUNTER AND H. BORSOOK. *Trans. Roy. Soc. Canada* **16**, Sect. V, 79–81(1922).—Repeated crystn. of oxyhemoglobin does not affect the tryptophan content, which is const. at 2.64%.
A. T. CAMERON

Enzymes of microörganisms. S. A. WAKSMAN. *Abstracts Bact.* **6**, 265–99, 331–60 (1922).—A review with bibliography.
E. J. C.

The explanation of the colloidal behavior of protein substances. JACQUES LOEB. *Naturwissenschaften* **11**, 213–21(1923).—A review.
C. C. DAVIS

Physico-chemical problems in the investigation of protoplasm. FRIEDRICH CZAPEK. *Naturwissenschaften* **11**, 237–42(1923).—An address, dealing historically with past researches.
C. C. DAVIS

Formation of membranes at the surface of protein solutions. M. WENBACKER. *Arch. sci. biol.* **3**, 236–52(1922); *Physiol. Abstracts* **7**, 397–8.—At the surface of protein solns. exposed to air increased viscosity is at once noticed. This is immediately followed by the formation of a viscous gel, and then by a solid membrane insol. in the fluid on which it has formed. This membrane is at first extremely thin, but in course of time it becomes so thick as to prevent movements of the underlying fluid. The thickening is due to the apposition of new layers, and the membrane acquires in this way a stratified structure. The formation of the membrane is hindered by autolytic phenomena splitting the protein mol., by the presence in the fluid of substances diminishing its surface tension, and by the addn. to the fluid of metallic salts which ppt. albumin.
H. G.

Presence of peptic enzyme in cerebrospinal fluid. D. LOEPER AND J. TONNET. *Progrès méd.* **48**, 318(1921); *Physiol. Abstracts* **7**, 292.—A proteolytic enzyme which forms peptones in acid soln. is present in the cerebrospinal fluid in amts. which increase during gastric digestion.
H. G.

Autoxidation and anti-oxygen action. C. MOUREU AND C. DUFRAISSE. *Anales soc. españ. fís. quím.* **20**, 383–93(1922).—Substantially the same as *C. A.* **16**, 1439.
L. E. GILSON

Phosphate and cell respiration. P. GYÖRGY. *Klin. Wochschr.* **1**, 172–3(1922).—Freshly isolated muscle cells (calf) were suspended in human milk whey. The rate at which the cells consumed O was then detd. O consumption is most rapid in the cow milk whey. The respiratory rate is not influenced by the whey colloids, but is a function of the phosphates. A phosphate-free whey is a poor respiratory medium. By adding a buffer phosphate mixt. (p_H 6.8) to dephosphated whey, the original respiratory rate

can be reëstablished and surpassed. Cell respiration is optimal at a phosphate concn. as low as 0.001 *N*. MILTON HANKE

V. A. H. H. Onslow. F. G. HOPKINS. *Biochem. J.* **17**, 1-4(1923).—Obituary. BENJAMIN HARROW

Influence of colloidal metals upon alkaline glucolysis. J. GOFFIN AND MARGUERITE GOFFIN. *Compt. rend. soc. belge. biol.* 1922, 21-2; *Physiol. Abstracts* **7**, 120(1922).—Colloidal metals (Pt, Pd, Au, Mn), which have no action on solns. of glucose, considerably increase glucolysis in an alk. medium. JOSEPH S. HEPBURN

Dental chemistry. W. F. RUDD. *Dental Cosmos* **65**, 413-4(1923).—Dental students should be taught general chemistry with special stress on the fundamental principles of physical, colloidal, physiological, and metallurgical chemistry. Qual. and quant. analysis and dental metallurgy should be combined into a major course in chemistry. Org. and biological chemistry should be taught as in schools of medicine. All courses should be given a "dental slant." JOSEPH S. HEPBURN

Diastatic hydrolysis and the combination of carbon chains. C. NEUBERG. *Wochschr. Brauerei* **39**, 103-5(1922); *Chimie et industrie* **9**, 367(1923); cf. *C. A.* **16**, 1786.—After indicating the essential differences between hydrolyzing diastases and zymases, N. sums up his recent work which led him to the discovery of a new type of diastase, *carboxylase*. A new type of diastase can cause the combination of C atom chains; *e. g.*, in a soln. of sugar or of pyruvic acid to which has been added BzH; yeast causes the formation, by means of *carboligase*, of an optically active keto-alc. with 9 C atoms. It is formed by the combination of a mol. of AcH (from the breaking down of the sugar or pyruvic acid) with a mol. of BzH. It has been isolated and identified as phenylpyruvic alc. A. PAPINEAU-COUTURE

Law of minimum in biology. JULES AMAR. *Compt. rend.* **176**, 466-8(1923); cf. *C. A.* **14**, 3683.—A general discussion is given to show that the phenomena of biology are governed by the law of minimum. L. W. RIGGS

Manganese in hair. J. MCCRAE. *J. S. African Chem. Inst.* **6**, No. 1, 18-9(1923).—Three samples of brown, one of very dark, and one of fair hair contained 0.38, 0.63, 0.72, 0.31, and 0.52%, resp., of ash, and these samples of ash contained 0.04, 0.025, 0.02, 0.04 and 0.03%, resp., of Mn or between 1 and 2 parts of Mn per million of hair. In the detns. the ash of the hair was treated with HNO_3, evapd. to dryness and the residue boiled with very dil. HNO_3 and filtered. To the filtrate was added $AgNO_3$ and $(NH_4)_2S_2O_8$ and the Mn was estd. colorimetrically. L. W. RIGGS

Measurement of the rates of oxidation and reduction of hemoglobin. H. HARTRIDGE AND F. J. W. ROUGHTON. *Nature* **111**, 325-6(1923).—Two solns. were prepd.: (1) at 1.5% soln. of whole blood in tap water, (2) a soln. of $Na_2S_2O_4$ in tap water which was rendered neutral to bromothymol blue by the addition of Na_2CO_3 soln. These 2 solns. were forced under a pressure of 500 mm. Hg into the mixing chamber of the measuring app. through conical jets of small bore, so that the 2 solns. underwent vortex motion at a high rate of speed. Tests showed that the mixing and chem. combination were complete in 0.0055 sec. or less. The mixed blood soln. and the reducing agent passed from the mixing chamber of the app. down a glass tube with a known velocity, being examd. at different positions by means of a reversion spectroscope by which the ratios of oxyhemoglobin to reduced hemoglobin could be detd. Increase of concn. of the $Na_2S_2O_4$ caused an increase in the rate of reduction up to a certain max. beyond which it cannot be raised by further concn. This indicates that the process consists of 2 stages, the removal of O from the hemoglobin and its combination with the reducing agent. The measurements of the velocity of oxidation of hemoglobin required large amts. of reduced hemoglobin soln. This was obtained by spraying a soln. of blood in tap water heated to 50° into a large vacuous container, thus causing the gases combined with the hemoglobin to be liberated. This reduced blood soln. was mixed with water contg. dissolved O by forcing both fluids into a mixing chamber like the above-mentioned. The reaction was complete in 0.01 sec. at 10°, and probably would be more rapid at body temp. L. W. RIGGS

Influence of alkaloids on the heat flocculation of protein solutions, and its relation to alkaloid reactions in general. ERNST FREY. *Arch. expil. Path. Pharm.* **95**, 36-44 (1922).—Heat flocculation of protein solns. is modified by alkaloids and a quant. comparison shows that a relation exists between the hemolytic activity and protein-flocculating property. Hemolytic action decreases according to the series, stovaine, alypine, cocaine, novocaine, quinine, pilocarpine, pyridine, strychnine, morphine, atropine, piperidine. The effect upon heat flocculation, also in decreasing series, is, for hemoglobin solns., quinine, stovaine, alypine, strychnine, pyridine, physostigmine, caffeine, novocaine, cocaine, pilocarpine, morphine, atropine, piperidine, and for serum colloid,

stovaine, quinine, strychnine, alypine, morphine, cocaine, novocaine, pilocarpine, physostigmine, caffeine, atropine, pyridine, piperidine. The detns. were made at diff. p_H concns. and at diff. temps. G. H. SMITH

Protoplasmic hysteresis and a method for its direct estimation. VLAD. RUZICKA. *Arch. ges. Physiol.* (Pflüger's) **194,** 135–48(1922).—Of the physical methods applied to tissues, the flocculation procedure is the most satisfactory for detecting changes in colloidal state. When 96% alc. is added to filtrates from tissue juices pptn. occurs, and the amt. of flocculation corresponds with the age of the animal from which the particular tissue was taken, the older the animal the greater the amt. of flocculation. This suggests that with increasing age there is a concn. of the tissue colloids, and that the biocolloids of older animals are nearer the isoelectric point. G. H. SMITH

Lipolytic enzymes of milk. ERNA SCHLOSSMANN. *Z. Kinderheilk.* **33,** 218–22 (1922).—The crit. temp. for the action of the lipase of human milk is 64–65°. When tested by acidity changes resulting from shaking a mixt. of human and cow milk it can be shown that the lipolytic action is detd. in part by the quant. relationships between the 2 milks. G. H. S.

Invertase. III. R. WILLSTÄTTER, JOHANNA GRASER AND R. KUHN. *Z. physiol. Chem.* **123,** 1–78(1922); cf. *C. A.* **16,** 3320.—The precipitability of invertase in yeast autolysate by Pb acetate depends upon the age of the autolysate. Only in fresh prepns. is there no pptn. The cause of this is not apparent, but it seems to depend upon the disappearance from the autolysate of material which holds the invertase in soln., or upon the formation during autolysis of substances precipitable by Pb which act as sp. absorbents for invertase. The enzyme cannot be extd. from the Pb ppt. quantitatively as in the case of $Al(OH)_3$ and kaolin ppts., but considerable recovery is possible by extn. with 1% K_2HAsO_4 or 1% $(NH_4)_2HPO_4$ in 0.05% NH_3 or 0.1% NH_3 alone. Extremely active prepns. have been obtained. Time values (as defined by O'Sullivan and Tompson) as low as 0.20 were obtained. Such prepns. show no characteristic reactions but the activity appears to be proportional to the P content. The optimum reaction for purified invertase is the same as that of the impurer forms heretofore used. Velocity consts. of the inversions catalyzed by it show increasing values as observed by other investigators, though a const. value was obtained with one prepn. At temps. between 50° and 60° the enzyme is gradually destroyed. Efforts to measure the direction of migration in an elec. field led to inconclusive results. Attempts to stabilize invertase prepns. with yeast gum, $CaCl_2$, glycine, leucylglycine and glycerol were only partially successful. **Remarks.** A. FODOR. *Ibid* **124,** 278–81(1923). R. L. STEHLE

The clouding of the cornea by lime. F. HAUROWITZ AND G. BRAUN. *Z. physiol. Chem.* **123,** 79–89(1922).—The appearance of a typical white turbidity in the cornea observed after the action of Ca, Ba and Sr ions in alk. soln. (alkalies and Mg under the same conditions produced no effect) is due to a colloid-chem. process, an irreversible flocking out or intramolecular change in the corneal mucoid, caused by the ions in question. R. L. STEHLE

The acceleration of fermentation. H. v. EULER AND S. KARLSSON. *Z. physiol. Chem.* **123,** 90–103(1922); cf. *C. A.* **16,** 3910.—Attempts to concentrate the coenzyme of yeast (prepd. from a filtered and concd. soln. of dry yeast by alcoholic pptn.) by dialysis, repptn. of the aq. soln. with alc., Pb pptn. and adsorption with kaolin and $Al(OH)_3$ were unsuccessful. R. L. STEHLE

Reductases. I. **Several conditions for the action of potato reductase.** I. A. SMORODINTZEV. *Z. physiol. Chem.* **123,** 130–44(1922). II. **A comparison of the influence of different alkalies on the reductase of the potato.** *Ibid* **124,** 202–10(1923).—Alkalies inhibit the action of reductase in a concn. as low as 0.004%. The effect is evidently due to the OH ion since the caustic alkalies are more effective than carbonate, bicarbonate and phosphates. At very low concns. no favorable action could be detected. R. L. STEHLE

Influence of reaction on the action of trypsin. II. W. E. RINGER. *Z. physiol. Chem.* **124,** 171–93(1923); cf. *C. A.* **10,** 482; **16,** 2338.—Salts with polyvalent cations inhibit the dissolving of fibrin by trypsin but salts which inhibit the dissolving by pepsin exert no action (thiocyanates, sulfates and ferrocyanides). The action is due apparently to the prevention of swelling of the fibrin. In the case of tryptic digestion of dissolved proteins the influence of cations is less marked since in this case the already fine division of protein particles facilitates contact with the enzyme and makes swelling of less importance. Bile salts inhibit the dissolving of fibrin by trypsin but not the digestion of dissolved protein. They do not affect swelling. When subjected to the action of alkalies the viscosity of protein solns. first increases, then decreases. This is due to an initial hydration followed by hydrolysis. R. L. STEHLE

The action of histozym on the homologs of hippuric acid. I. A. SMORODINTZEV. *Z. physiol. Chem.* **124,** 123-39(1923).—Histozym is an endoenzyme. It is insol. in H_2O but sol. in alc.-ether and Me_2CO. Autolysis partially destroys it. The richest sources are pig kidneys and the skeletal muscles of dogs, but all the organs of dogs investigated (kidneys, liver, spleen, lungs, heart muscle) split $BzNHCH_2COOH$ to some extent. Histozym is also present in the kidneys of calves, oxen and horses. It does not split β-benzoylalanine, β-benzoylaminobutyric acid, benzoylaminoisobutyric acid or *l*-α-benzoylaminobutyric acid, but does split hippuric acid, α-benzoylalanine, *l*-benzoylleucine, *d*-α-benzoylaminobutyric acid, glycocholic acid and taurocholic acid.
R. L. STEHLE

Kinetics of saccharase action. H. v. EULER AND K. MYRBÄCK. *Z. physiol. Chem.* **124,** 159-70(1923).—For sucrose concns. between about 5 and 20% and with varying quantities of enzyme the product $k \times g$. sucrose concn. is const. for each concn. Assuming that the velocity of saccharase action is proportional to the concn. of the compd. between enzyme and substrate, and that at half the max. product obtainable in a given sucrose-saccharase system half of the enzyme is bound, E. and M. have calcd. the value of K in the equation (enzyme) × (substrate)/(enzyme) — (substrate) = K_M and found values of about 0.020.
R. L. STEHLE

Nucleins. S. NAKAGAWA. *Z. physiol. Chem.* **124,** 274-7(1923).—When the heads of herring sperm were treated with pepsin-HCl there was a change in optical rotation which was caused apparently by hydrolysis in the nucleic acid fraction of the substance. Older work in which nucleins were isolated by subjecting crude material to the action of pepsin-HCl to remove the loosely bound protein portion probably did not lead to the isolation of well defined materials since the nucleic acid fraction was in all likelihood attacked.
R. L. STEHLE

Peroxidase. III. RICHARD WILLSTÄTTER AND ADOLF POLLINGER. *Ann.* **430,** 269-319(1923); cf. *C. A.* **15,** 1543.—A detailed study is reported of the influence of adsorption on and subsequent elution from alumina and kaolin and of pptn. by tannic acid on the activity of peroxidase solns. Two methods of purification are worked out in detail. According to one, the peroxidase in a soln. having a purpurogallin no. 302 is 1st adsorbed on alumina suspended in 50% EtOH, removed in H_2CO_3 soln. and then again adsorbed on alumina in dil. EtOH. One further adsorption on kaolin in 50% EtOH and 3 further adsorptions on alumina raised the purpurogallin no. to 4900, the highest value as yet observed. In the 2nd method the peroxidase is subjected to 4 adsorptions on alumina in 50% EtOH and 3 on kaolin in 0.02 *N* AcOH and a pptn. by tannin, the final purpurogallin no. being 3070. The question as to whether Fe enters into the constitution of peroxidase cannot be conclusively settled on the analytical data because, although for a given natural source and method of purification the Fe content runs roughly parallel with the purpurogallin no., a change either in the source or the process affects the proportion of Fe in a way which cannot at present be simply accounted for.
C. J. WEST

Periodic opacity of certain colloids in progressively increasing concentrations of electrolytes (HOLKER) **2.** Cataphoresis of proteins (SVEDBERG, JETTE) **2.**

B—METHODS AND APPARATUS

STANLEY R. BENEDICT

Apparatus for micro-manipulation and micro-injection. R. CHAMBERS. *Proc. Soc. Exptl. Biol. Med.* **19,** 85-7(1921).—The micro-manipulator can be attached to the stage of any microscope. It consists of a system of rigid metal bars and spring hinges manipulated by screws which cause the tip of a needle or a pipet to move in 3 arcs at right angles to one another. The movements are fine and under perfect control when viewed under the highest magnification. The micro-injector consists of a thin-walled steel cylinder filled with Hg or inert oil and connected with a glass Barber pipet by means of a small flexible steel tube. Pressure on the cylinder by leverage clamps causes the contents to move in the pipet and permits of injection and suction in microscopic quantities.
C. V. B.

A modified Hellige colorimeter for the comparison of solutions containing two colors. V. C. MYERS. *Proc. Soc. Exptl. Biol. Med.* **19,** 78(1921); cf. *C. A.* **17,** 781.—An additional standard wedge is introduced in the colorimeter. The modified app. is applicable to the detn. of the reaction of the urine, blood and culture media; by using Sörensen's phosphate solns. p_H 5.2 and p_H 7.4 for bromocresol purple and p_H 6.4 and p_H 8.4 for phenol red, a range of p_H 5.3 to p_H 8.3 is covered with an accuracy of ± 0.3.
C. V. B.

Isopropyl alcohol, a convenient laboratory anesthetic for cats. D. I. MACHT. *Proc. Soc. Expll. Biol. Med.* **19**, 85(1921).—The cats are anesthetized with ether, 5–5.5 cc. of isopropyl alcohol with 3 times the vol. of H_2O are given by stomach tube. Narcosis lasts for hrs. or days; the blood pressure remains high and respiration is satisfactory for many hrs. C. V. B.

Iron reaction in brains. A. GANS. *Nederland. Tijdschr. Geneeskunde* **67**, I, 1044 (1923).—Iron can be detected by $(NH_4)_2S$ in sections of brains. In paralysis the pigment grains around the vessels exhibit the reaction. R. BEUTNER

The use of potassium or sodium bromide as a source of bromine for urea estimations. C. H. COLLINGS. *Chem. News* **126**, 180–1(1923).—The estn. of urea in urine analysis is usually carried out by interaction with NaBrO. The app. described is connected with an aspirator or pump to provide air, which causes the sepn. and removal of Br. The bromide is broken up by the addition of HNO_3. This soln. then develops a transparent reddish color which after 3 min. becomes opaque owing to evolution of Br. The air current picks it up and carries it to the bottle contg. NaOH where the hypobromite is formed. Hypobromite may be produced from KBr or NaBr in this app. at a cost much lower than that from liquid Br. W. H. BOYNTON

Determination of pepsin by means of thiosalicylic acid method. C. HOLLSTEIN. *Beitr. Physiol.* **2**, 11–2(1922); *Physiol. Abstracts* **7**, 402.—To obtain comparable results, acid-serum mixts. must be of the same age and thiosalicylic acid concn. H. G.

Quantitative determination of minute quantities of phosphates in biological products by the cerulean molybdic method. G. DENIGÈS. *Compt. rend. soc. biol.* **84**, 875–7(1921); *Expt. Sta. Record* **47**, 714.—Various details in the technic of the method described (*C. A.* **15**, 218) are presented. D. proposes the name cerulean molybdic on account of the deep blue color of the phosphomolybdic compd. formed. H. G.

Simple method for the determination of urobilin. E. HERZFELD. *Schweiz. med. Wochschr.* **52**, 585–6(1922); *Physiol. Abstracts* **7**, 396. H. G.

Some new reactions for the detection of sterols. G. S. WHITBY. *Biochem. J.* **17**, 5–12(1923).—*Reaction A:* To 2 cc. of a $CHCl_3$ soln. of the sterol add 2 cc. of a reagent prepd. by mixing concd. H_2SO_4 and formalin 50 : 1, and shake the contents. When the layers have sepd., the upper ($CHCl_3$) layer is cherry-red, and the lower (H_2SO_4) layer is brownish red, and shows an intense green fluorescence. Pour off the upper layer into a dry test-tube and add 2–3 drops Ac_2O; a bright blue color, slowly changing to green, is obtained. The reaction is more sensitive than Salkowski's. *Reaction B:* To 2 cc. of a soln. of sterol in glacial AcOH, add, with shaking, 25 drops of a reagent prepd. by mixing concd. H_2SO_4 and formalin 50 : 1. This gives a rose-colored and fluorescent soln. This reaction is twice as sensitive as the Liebermann-Burchard one, but cannot be used for the quant. detn. of sterols. *Reaction C:* Add the sterol to one drop of Ac_2O on a piece of porcelain and gently heat until the sterol has melted and the excess anhydride has been driven off. Cool and moisten with concd. HNO_3. A blue or blue-green color develops in a few secs. "This reaction is chiefly of value for cholesterol; it is of less value for phytosterols." To distinguish the sterol from asterolin (a glucoside), the following reaction has been devised: Pour 1–2 cc. concd. H_2SO_4 onto a few particles of a sterolin contained in a test-tube, warm the mixt. until the solid has gone into soln., cool, and add a cold, satd., aq. soln. of thymol. The result is an orange color and a strong green fluorescence in the lower layer and a violet ring at the juction of the upper and lower layers. With sterols the violet ring is missing. "The reactions applicable to the detection of sterols in soln. . . . are, in their essential features, similar." BENJAMIN HARROW

Determination of lactic acid in blood. J. J. R. MACLEOD WITH M. E. ARMOUR. *J. Lab. Clin. Med.* **7**, 635–42(1923).—The method is a modification of that of von Fürth and Charnass (*C. A.* **5**, 51). Weigh a flask contg. 100 cc. 2% HCl. Add 25–50 cc. blood, weigh and add enough 5% $HgCl_2$ to ppt. all proteins. Make up to 250 cc. with water, shake and after 30 min. filter. Remove excess Hg in the filtrate with H_2S. Use an aliquot portion for further analysis. Make almost neutral to litmus with 4% NaOH and evap. to about 50 cc. It is important that the temp. never exceed 40°. Transfer to the extn. tube of a Dunbar extn. app., washing with 25 cc. satd. $(NH_4)_2SO_4$ soln. Add enough $(NH_4)_2SO_4$ to sat. the fluid in the app., add 3 cc. H_3PO_4, and ext. 48 hrs. with alc.-free ether. For this extn. use 200 cc. ether plus 10 cc. 0.1 *N* NaOH in the container surrounding the extn. tube. Heat the alk. ext. on a water bath heated with an elec. lamp, and distil off ether until no more comes off, never allowing the temp. to exceed 50°. Finally place the flask contg. alk. Na lactate in boiling water a few min. to drive off the last traces of ether, transfer with the aid of 300 cc. 0.5% H_2SO_4 to a 1-l. fractional distn. flask, fitted with a rubber stopper through which passes the tube of a stop-

pered funnel, the lower end of the tube being drawn out to a fine point which extends close to the bottom of the flask. Fill this tube with $KMnO_4$ by suction. Connect the distn. flask by the side arm with a worm condenser, the delivery tube of which leads to a 400-cc. cylinder standing in cold H_2O. Place in the cylinder 10 cc. 0.2 *N* $KHSO_3$ and 10 cc. distd. H_2O. Distil into this cylinder, allowing $KMnO_4$ to flow into the distn. flask at such rate that it disappears as it enters, and then finally until a brown color persists. Close the tap and boil 10 min. Titrate the contents of the receiver against standard I, with starch soln. as indicator. Each cc. 0.1 *N* I soln. corresponds to 0.05 cc. 0.1 *N* lactic acid. E. R. LONG

Notes on the comments of Reznikoff on the use of sodium sulfate as a precipitant for "pseudoglobulin." P. E. HOWE. *J. Lab. Clin. Med.* **8**, 408–9(1923); cf. *C. A.* **17**, 1258.—An answer to a criticism. E. R. LONG

A simplified technic for clinical blood chemistry. A. MIRKIN AND S. J. DRUSKIN. *J. Lab. Clin. Med.* **8**, 395–405(1923).—An outline of methods, for the details of which the original must be consulted. Seven cc. of well oxalated blood are sufficient for an analysis including CO_2-combining power, non-protein N, urea, uric acid, creatinine, cholesterol, sugar and chlorides. E. R. LONG

The determination of hemoglobin. R. L. HADEN. *J. Lab. Clin. Med.* **8**, 411–4 (1923).—Hemoglobin is converted into acid hematin and compared with a standard in the colorimeter. Prepare the standard as follows: Withdraw by venipuncture about 50 cc. blood, defibrinate by whipping, and strain through gauze. Det. its hemoglobin content by the O capacity method of Van Slyke. Dil. with 0.1 *N* HCl to make a 20% soln. contg. 15.6 g. hemoglobin per 100 cc. blood. Add an equal vol. of glycerol. This soln., a 10% soln. of a blood contg. 15.6 g. hemoglobin per 100 cc., will keep without fading for months. For clinical detns. make a 1 : 100 diln. of blood in 0.1 *N* HCl in an ordinary red cell pipet. Let stand 10 min. to convert the hemoglobin to acid hematin, discard the first drop and blow the balance into the cup of the colorimeter, and compare with the standard. E. R. LONG

Spectrochemical studies on some biochemical color reactions. TETSUTARO TADOKORO. *J. Coll. Agr. Hokkaido Imp. Univ.* **10**, Pt. 6, 141–89(1923).—This work was for the purpose of obtaining accurate measurements of absorption bands with a quartz spectroscope. A 100 c. p. tungsten elec. lamp was used as the source of light for the visible spectrum, and an Fe arc or H lamp for the invisible. Photographs of the absorption spectra were taken, the time of exposure varying with the source of light used. Curves were plotted by putting the log of the thickness in mm. of 0.0001 *M* soln. on the ordinate and the wave length on the abscissa. In this manner the color reactions of the commoner hexoses, pentoses, protein decompn. products, glucosides and alkaloids were studied. The results are shown in 36 tables, 31 charts of curves and 20 photomicrographs. The final table gives the position of the absorption bands in min. concn., the boundary lines of the bands and the rate of growth. L. W. RIGGS

Furfural as a biological reagent. C. E. THARALDSEN. *Science* **57**, 305–6(1923).—Furfural has been manufd. recently in large quantities at a price which indicates that it may become the cheapest aldehyde commercially available. Its reactions resemble those of both C_6H_5CHO and HCHO, but it differs from them in its high b. p. and wide range of solvent power, making it a useful vehicle for stains in histologic work. Furfural in 7.5% soln. preserves anatomical specimens without the excessive shrinking or hardening observed with HCHO, although it causes them to turn brown in color. The irritation of the eyes and nose caused by HCHO is absent with furfural. Discoloration of the hands is readily removed by warm dil. ammonia. If to 1000 cc. of furfural 1 cc. of HCl is added the mixt. completely resinifies in about 36 hrs. Such a mixt. is better and cheaper than the usual injection mass. L. W. RIGGS

Detection and determination of formaldehyde in the urine after the introduction of urotropine. KURT VOIT. *Arch. expll. Path. Pharmakol.* **95**, 124–8(1922).—The exact estn. of CH_2O in the urine after the oral administration of urotropine is impossible, since unaltered urotropine may be present, and since the formation of CH_2O in the urine may readily take place through the influences of temp. and p_H. For the detection of CH_2O the test of Jorissen-Vanino is excellent. CH_2O could never be detected in the blood or the spinal fluid after oral administration of urotropine. G. H. SMITH

Handbuch der biologischen Arbeitsmethoden. Angewandte chemische u. physikal. Methoden. Pharmakologie, Pharmazie, Toxikologie, Nachweis u. Bestimmung von Giften auf physikal. Wege (Optische u. kolorometrische Methoden). Nachweis u. Bestimmung von Giften durch Elektrolyse, THEODOR SABALITSCHKA. Pp. 613–752. **Nahrungs u. Genussmittel. Nahrungs- u. Genussmittel-Untersuchungen. Eier u. Eikonserven, Speise-fette und Speiseöle. Fleisch u. Fleischpräparate,** PAUL BUTTENBERG.

Milch, Käse, Kafee, Tee, Kakao (Schokolade) u. ihre Ersatzstoffe, Jos. TILLMANS AND ROBERT STROHECKER. (a) **Mikroskop Untersuchung,** C. GRIEBEL. (b) **Chemische Untersuchung,** E. SCHOWALTER. Pp. 527–894. **Methoden zum Studium d. Funktionen d. einzelnen Organe d. tierischen Organismus. Allgemeine Methoden. Dauerinfusion od. die permanente parenterale Injektionsmethode,** E. O. FOLKMAR. **Methodik der Parabiose,** R. VON DEN VELDEN. **Ueber d. Technik d. Organtransplantation (ausschliesslich Geschlechtsorgane),** ERNST UNGER. **Zusammensetzung u. Herstellung d. wichtigsten Nährlösungen f. Versuche an überlebenden Organen,** RUDOLF DITTLER. Pp. 229–432. Edited by Emil Abderhalden. Berlin and Vienna: Urban and Schwarzenberg.

C—BACTERIOLOGY

A. K. BALLS

The reduction of amino acids into simpler natural bases (amines) by B. dysenteriae (Shiga). H. W. ACTON, R. N. CHOPRA AND T. C. BOYD. *Indian J. Med. Research* **10,** 837–48(1923).—It was observed that an acute attack of dysentery during pregnancy caused miscarriage. Expts. showed that Shiga's bacillus of dysentery, in a culture rich in amino acids (veal broth), formed a substance which contracts an isolated guinea-pig uterus. The substance is probably a non-volatile amine. H. V. ATKINSON

Typing of different strains of Bacillus botulinus by immunologic methods. J. BRONFENBRENNER, M. J. SCHLESINGER AND S. C. CALAZANS. *Proc. Soc. Exptl. Biol. Med.* **19,** 21–2(1921).—Toxin-antitoxin tests divide strains of bacillus botulinus into 2 distinct groups. The agglutination test is equally effective and is applicable to strains which have lost their toxicity under lab. cultivation. C. V. B.

Diphtheria toxin. P. J. MOLONEY AND L. HANNA. *Proc. Soc. Exptl. Biol. Med.* **19,** 24–7(1921).—During active reproduction little toxin was produced in broth cultures of *B. diphtheriae;* as the growth rate decreased, toxin production rapidly increased and after reaching a max. suddenly decreased. The possible origin of the toxin from non-reproductive cells, non-viable cells, from protoxin or by cell autolysis is discussed at length. C. V. B.

The production of tyrosine by a putrefactive anaerobe. S. C. HALL AND F. FINNERUD. *Proc. Soc. Exptl. Biol. Med.* **19,** 48–50(1921).—Certain anaerobes, as *B. bifermentans, B. centrosporogenes* and *B. histolyticus,* when grown in deep brain medium, ground meat, salmon, milk or suspended casein, form tyrosine. The medium must not contain an excess of monosaccharides. C. V. B.

Does the introduction of an ethoxy group into aromatic compounds increase their bactericidal action upon the pneumococcus and the gonococcus? A. D. HIRSCHFELDER AND L. J. PANKOW. *Proc. Soc. Exptl. Biol. Med.* **19,** 64–7(1921).—The introduction of an ethyl group in substances like Na phenolsulfonate and Na salicylate or *p*-aminophenol and *p*-nitrophenol caused no increased bactericidal action. C. V. B.

The action of cod-liver oil on the tubercle bacillus. H. B. CAMPBELL AND J. KIEFFER. *Am. Rev. Tuberculosis* **6,** 938–49(1922).—Cod-liver oils had a definite inhibitory and bactericidal action on virulent tubercle bacilli; cottonseed oil, used for control, did not inhibit the growth of the bacilli to the same marked degree and has no bactericidal action. Cod-liver oil also inhibited the growth of a lepra bacillus, an avirulent tubercle bacillus and *B. typhosus.* The aq. exts. of cod livers have shown no true inhibitory or bactericidal action on the tubercle bacillus. A granulation of the tubercle bacilli and allied bacteria was also noted. Cod-liver oil, extd. with as little heat as possible and not refined, seemed to have a more potent action than commercial refined oil or oil extd. by heat. No radioactivity of cod-liver oil was noted. H. J. CORPER

Filtrable "substance" antagonistic to dysentery and other organisms (d'Herelle's phenomenon, bacteriophage, bacteriolytic agent, bacteriolysant, etc.). W. C. DAVISON. *Abstracts Bact.* **6,** 159–77(1922).—A review with bibliography. E. J. C.

Bactericidal power of salts of tellurium and selenium. A. CAVAZZUTTI. *Ann. d'ig.* **31,** 551–4(1921); *Physiol. Abstracts* **7,** 276.—Te salts have a considerable, Se salts a weaker, bactericidal action. The *K salts* are more active than *Na salts.* The activity varies with the bacterial species. H. G.

Bacteria and blood pigment. H. KAMMERER. *Arch. expil. Path. Pharmakol.* **88,** 247–86(1920); *Physiol. Abstracts* **6,** 92.—The effects of various bacteria on hemoglobin are set out. Not only is hemolysis produced, but streptococci and pneumococci cause methemoglobin formation; hematin was not produced. In agar cultures with blood, colorless areas occur, the chief cause of which is hemolysis and diffusion of the pigment

into the neighborhood. Mesohematin and metallic salts of mesoporphyrin kill bacteria, or inhibit their action in varying degree. Sensibilization by light plays no part in this. Paramecia are rendered quiescent by mesohematin and hematoporphyrin, but not by hematin and bilirubin solns. Mesohematin does not affect phagocytosis in warm-blooded leucocytes either *in vivo* or *in vitro*. Hematin in dil. alkali inhibits *B. anthracis* and *megatherium*, but hematoporphyrin, bilirubin, etc., do not. The above are examples of the numerous data given *in extenso*. H. G.

The action of bacillus Delbrücki on the deterioration of nitrogenous material. H. COPPIN. *Bull. inst. sup. ferm. Gand.* **22**, 195–201(1921); *Physiol. Abstracts* **7**, 142.—The lactic acid secreted by this bacillus activates the deterioration of nitrogenous material; disatase does not prevent it. H. G.

Yeast deprived of membrane. J. GIAJA. *Compt. rend. soc. biol.* **86**, 708–9(1922); *Physiol. Abstracts* **7**, 275.—The digestive juice of *Helix pomatia*, which dissolves the cell membrane of yeast without disorganizing the cell, diminishes the fermentative activity of both normal and toluenized yeast. Production of CO_2 by autofermentation in the absence of sugar is increased both by toluene and *Helix* juice, in the first case by self-digestion of the killed cell, in the second by the production of material for fermentation by the digestion of the cell membrane. H. G.

Destructive action of quinine salts on the bacteriophage of Herelle. G. ELIAVA AND E. POZERSKI. *Compt. rend. soc. biol.* **85**, 139–41(1921); *Physiol. Abstracts* **7**, 385.—Quinine salts destroyed the bacteriophage of *B. dysenteriae*, but phenol and NaF were without effect in the concns. used. H. G.

Bactericidal action of tellurium derivatives of certain aliphatic β-diketones. G. T. MORGAN, E. A. COOPER AND A. W. BURTT. *Biochem. J.* **17**, 30–3(1923).—Of the 7 compds. tested, *B. coli communis* being used, the most active was tellurium dipropionylmethane, which was found to be bacteriocidal in a dilution of 1 : 9 million. BENJAMIN HARROW

Reaction as a consequence of the injection of bacteriophage. R. BRUYNOGHE AND J. MAISIN. *Compt. rend. soc. belge biol.* **1922**, 32–3; *Physiol. Abstracts* **7**, 137 (1922).—Inoculation of man with bacteriophage produces a reaction and symptoms recalling those of an infection. JOSEPH S. HEPBURN

The relationship between hydrogen-ion concentration and the action of eucupine on diphtheria bacilli. K. G. DERNBY AND H. DAVIDE. *Z. Immunitäts.* **35**, 447–9 (1923).—The bactericidal action of the quinine alkaloids increases with rising alkalinity. At p_H 7.9 a concn. of 2 : 100,000 is bactericidal, at 7.6, 4 : 100,000. Only with a concn. of 8 : 100,000 is the bactericidal action independent of the reaction. E. R. LONG

Influence of the source and nature of nitrogen upon the production of organic acids in Sterigmatocystis nigra. MARIN MOLLIARD. *Compt. rend. soc. biol.* **87**, 967–9(1922).—Two nutritive media were employed; each contained 7 g. of sucrose in 150 cc. but in one the source of the N was NH_4NO_3 and in the other NH_4Cl. The cultures were grown at 36°. The wt. of the mycelium was detd. at regular intervals, when the amt. of sugar consumed and the quantity of oxalic and citric acids produced were also measured. In the first medium the sugar was completely used up in 20 days, at which time the mycelium attained a wt. of 1.224 g. The citric acid attained a max. of 0.262 g. in 10 days when it commenced to diminish and disappeared after 15 days. The oxalic acid gradually increased and on the 20th day it was 0.762 g. In the NH_4Cl medium, on the contrary, the mycelium has grown more (1.643 g. on 30 days) and the sugar was not consumed until after 40 days. There was noticeably less oxalic acid formed, only 0.102 g. in 20 days, while the citric acid reached 0.339 g. by the end of 20 days. S., MORGULIS

Free acid and its influence upon the reproduction of yeast and of microbes. MARC H. VAN LAER AND J. MERTEN. *Compt. rend. soc. biol.* **87**, 990–2(1922).—The optimum p_H of the medium in which different organisms grow varies with the particular species. Thus, for brewer's yeast this was a p_H = 4.6; for the Frohberg yeast, 6.0; for *Brettanomyces lambicus*, 3.8; *Saccharobacillus pastorianus*, 5.5; *Bacillus viscosus bruxellensis*, 5.5. By symbiosis of 2 different organisms this optimum seems to be changed for each independently of the other. Thus, by growing together the Frohberg yeast and *Saccharobacillus pastorianus*, the optimum p_H for the former was 4.6 and that for the latter 6.8. S. MORGULIS

The excretion of phosphorus compounds by bacteria. E. POZERSKI AND MAX M. LÉVY. *Compt. rend. soc. biol.* **87**, 1157–9(1922).—The expts. were made with the *Bacillus suiga* and *Proteus vulgaris*. The presence of phosphates was tested by means of a sulfomolybdic reagent and $SnCl_4$, which yields a blue coloration with phosphates even in extremely minute amts. Suspended in distd. water, the bacteria give off

phosphates to the medium. The production of the phosphates is associated with the vital functions of the bacteria, as this does not occur when dead bacteria are used. This conclusion is further corroborated by expts. where 2 lots of the organisms are employed and treated in a similar manner except that one set is heated to 70°. The latter produce no phosphates, while the unheated cultures give off considerable amts.
S. MORGULIS

The excretion of phosphates by microörganisms. Influence of formalin. E. POZERSKI AND MAX LÉVY. *Compt. rend. soc. biol.* **88**, 18–20(1922).—Further evidence presented to show that the excretion of phosphates is a characteristic of the living microbes.
S. MORGULIS

The influence of hydrogen-ion concentration upon structure. I. Hemophilis influenzae. GUILFORD REED AND J. H. ORR. *J. Bact.* **8**, 103–10(1923).—*H. influenzae* grown on standard blood agar 7.4 to 7.6 usually forms short rods only. If the medium is more acid than 6.8 or more alk. than 8.0 extreme pleomorphic forms are produced.
JOHN T. MYERS

The neutralization of bacteriophages. R. BRUYNOGHE AND R. APPELMANS. *Arch. intern. pharmacodynamie* **27**, 81–4(1922).—Rabbits vaccinated with the resp. bacteriophages of 2 different strains of typhoid yielded sera which were sp. in their neutralizing action upon the resp. bacteriophages. These results contradict d'Herelle's theory of the essential identity of all bacteriophages.
W. A. PERLZWEIG

The therapeutic value of the bacteriophage. R. APPELMANS. *Arch. intern. pharmacodynamie* **27**, 85–116(1922).—Bacteriophage was grown in the presence of alysable organism and the progress of its growth was measured by a method of diln. The production of bacteriophage was found independent of the amts. of either the lytic substance or of the lysable organism, provided a sufficient period of time is allowed to elapse for the process to come to completion. When a bacteriophage culture is centrifugalized there is no sedimentation of bacteriophage at the bottom of the tube. Upon the addn. of bacteriophage to a lysable culture and subsequent centrifugalization the supernatant fluid shows a decrease in the concn. of bacteriophage most of which is found adhering to the sedimented bacteria. This does not happen when bacteriophage is mixed and centrifugalized with a culture of bacteria not susceptible to its lytic action. Bacteriophage solns. may be preserved for long periods of time without losing their activity. By means of numerous transplants with a given strain of a lysable organism the virulence of the bacteriophage for that organism was greatly increased while it was decreased for other strains. Heat and ultra-violet rays possess a destructive effect upon bacteriophages. The bacteriophages are not absorbed from the alimentary tract of animals. When injected subcutaneously they are absorbed and are generally distributed in the body, but are eliminated within a few days in the excretions, persisting for the longest time in the spleen (5–6 days). In man the absorption of bacteriophage is accompanied by the type of general reaction which is observed following an infection. This reaction usually subsides within 48 hrs., only a slight local edema at the site of injection persisting longer. From the prophylactic and curative effects of bacteriophages upon infections the claims of d'Herelle could not be confirmed by the author's expts. Animals previously infected with typhoid bacilli or staphylococci were not in the least benefited by the administration of the homologous bacteriophages. Only in rabbits receiving the bacteriophage simultaneously with the staphylococcus culture was the production of a local abscess, such as was produced in the control animals, prevented. Clinically a small degree of success was attained in the treatment of certain staphylococcus infections by bacteriophage treatment. Typhoid carriers were not affected in any desirable way. The behavior of bacteriophage in the animal body is ascribed solely to its lytic ferment and not to hemoclasis, accelerated immunization or stimulated phagocytosis, as claimed by d'Herelle.
W. A. PERLZWEIG

The behavior of bacteriophages in gelatin. O. NAKAMURA. *Wiener klin. Wochschr.* **36**, 86–7(1923).—The action and development of bacteriophage are greatly inhibited in the presence of gelatin gels. Bacteriophages transplanted from gelatin to agar plates are fully active in destroying the homologous bacteria. While bacteriophages are reactive and grow upon agar, the latter also exercizes an inhibiting effect which is analogous but quant. less than that of gelatin. Gum arabic and gum tragacanth gels have similar effects upon bacteriophages.
W. A. PERLZWEIG

Possibility of actual intestinal disinfection. AUGUSTE LUMIÈRE. *Compt. rend.* **176**, 540–1(1923).—Sodium argentothioglycerolsulfonate, $CH_2(SAg)CH(OH)CH_2SO_3Na$, is a yellow powder very sol. in H_2O, not pptd. by NaOH, chlorides or egg albumin. It is not changed by light, does not stain the tissues and its lethal dose by mouth is 1 g. per kg. It is antiseptic in dilns. of from 1 in 5000 to 1 in 10000, varying with

the bacteria treated. If 0.05 g. of fecal matter from a normal dog is mixed with 20 cc. of sterile bouillon in a flask and 5 drops of this mixt. is added to 20 cc. of bouillon in a second flask and incubated 48 hrs. a host of colonies of bacteria is obtained on plating. If during 10 days previous to taking the sample of feces the animal received 1 g. of benzonaphthol per day, no lessening of the bacteria was observed on making a culture. A second dog receiving 1 g. per day of Na argentothioglycerolsulfonate by mouth for 4 days gave practically sterile feces. Clinical tests confirm the remarkable bactericidal action of this substance. L. W. RIGGS

Influence of copper upon lactic fermentation. MARC FOUASSIER. *Compt. rend.* **176**, 606–8(1923).—Three conditions were studied: (1) influence of the presence of metals upon the acidification of milk subjected to lactic fermentation; (2) influence of previous contact of metals with milk, which is afterwards subjected to lactic fermentation in the absence of these metals; (3) antiseptic action of metals on lactic enzymes in aq. dilns. In the tests about 10 sq. cm. of the metal in sheet form was placed in contact with 10 cc. homogenized and sterilized milk, the lactic enzyme was introduced by a few drops of its sterilized aq. soln., and acidity was detd. by the usual method. Contact of Zn, Al, Pb, Ag, Fe, Ni, Cu and Sn, resp., with fermenting milk showed that acidification was more rapid in the presence of Fe and less rapid in the presence of Cu as compared with the rate of acidification in the presence of other metals, these latter agreeing substantially with controls from which metals were absent. The retarding action of Cu was evident when present in milk or in aq. soln. of the lactic enzyme. Cu placed in contact with milk for 8 hrs. and removed caused a retardation in the rate of acidification of the milk when fermented after the removal of the Cu. L. W. R.

Effect of sodium hypochlorite upon the spores of American foul brood (Bacillus larvae). H. F. WILSON AND W. A. HADFIELD. *Science* **57**, 334(1923).—In experiments with working colonies of bees infected with *B. larvae* it was found that NaClO has a solvent action on dead bees, pollen, cocoons and other debris in the combs but that it did not injure the wax and did thoroughly disinfect the comb and hive. In dil. soln., NaClO added to the food did not harm the bees, and though the feeding soln. was inoculated with a water soln. of the spores a 1 to 25 diln. of a 3% NaClO soln. prevented a transmission of the disease. Feeding NaClO did not counteract the disease after it had become established. L. W. RIGGS

JORDAN, EDWIN O.: **Textbook of General Bacteriology.** 7th Ed. Revised and enlarged. Philadelphia: W. B. Saunders Co. Reviewed in *Abstracts Bact.* **6**, 262 (1922).

D—BOTANY

B. M. DUGGAR

The biochemistry and physiology of the surface layer of living cells. HANSTEEN-CRANNER. *Medd. Norges Landbrukhois* 2(1922); *Naturwissenschaften* **10**, 948–9.—A new line of investigation is reported wherein phosphatides are studied outside of the cell and proved to play a very important role in the cell activity. Phosphatides were found in the cell wall of beets, rape, beans, peas, etc., varying greatly in their soly. in H_2O and in EtOH and their pptn. with $Pb(OAc)_2$. Ca ions inhibited, K ions increased extn. with H_2O, indicating a reduction and increase in cell permeability, resp. Phosphatides were present also in the interior of the cell, particularly at the surface of the protoplasm. The plasmatic boundary layer of cells, *i. e.*, the plasma and vacuole membrane, represents a colloidal system whose semi-solid, hydrophilic dispersion phase consists of H_2O-insol. phosphatides, and whose liquid, disperse phase consists of H_2O-sol. phosphatides; this boundary layer with its entire phosphatides penetrates the adjacent cell walls at all points and is intimately bound with these last; the cell walls form a colloidal network consisting of cellulose and hemicellulose, the meshes of which contain all the phosphatides of the plasmatic boundary layers. The cell membrane is not a dead structure but takes an active part in absorption. No diffusion of protein was found to accompany diffusion of phosphatides, indicating that the total plasma surface is composed of phosphatides and that protein is lacking. The great mutability of phosphatides between sol and gel results in well defined changes in permeability with resulting diffusion of widely different compds., and their ability to combine with metals, acids, sugar, protein, alkaloids, etc., render them peculiarly adapted for "carriers" in metabolism. Cf. *C. A.* **16**, 3497. C. C. DAVIS

An undetermined principle obtained from poison ivy. E. D. BROWN. *Proc. Soc. Exptl. Biol. Med.* **19**, 136–7(1921).—The substance appeared as a ppt. after long standing of a filtrate obtained after pptg. with Pb acetate. Its properties indicate that it is probably not a glucoside but may belong to the group of phenols. C. V. B.

The presence of aucubin and sucrose in the seeds of Rhinanthus crista-galli L. M. BRIDEL AND MISS M. BRAECKE. *Bull. soc. chim. biol.* **5**, 10–22(1923).—See *C. A.* **17**, 299. A. T. C.

The biological significance of alkaloids in plants. G. CIAMICIAN AND M. C. RAVENNA. *Bull. soc. chim. biol.* **5**, 59–78(1923).—A review. A. T. CAMERON

The influence of potassium on the development of plants and their morphological and anatomical structure, with special reference to agricultural crops. H. WIESSMANN. *Z. Pflanzenernähr. Düngung* **2A**, 1–79(1923).—Pot expts. mainly of plant physiol. interest. W. H. FRY

The toxic constituent of greasewood (Sarcobatus vermiculatus). J. F. COUCH. *Am. J. Pharm.* **94**, 631–41(1922).—In the abstract in *C. A.* **17**, 1269 the second sentence should read "Toxic alkaloids, glucosides, and saponins were *absent*," not "present" as erroniously given. W. G. C.

Determination of acid and sugar in aqueous extract from wheat varieties and of resistance to rust. A. BYGDÉN. *K. Landtbr. Akad. Handl. och Tidskr.* **58**, 418–23 (1919); *Meddel. Centralanst. Försöksv. Jordbruksområdet* **1922**, No. 192, 20–5; *Expt. Sta. Record* **47**, 222.—Tabular data are given. H. G.

Biochemistry and physiology of the boundary layers of living plant cells. B. H. CRANNER. *Meldinger Norges Landbruksheiskole (Kristiania)* **2**, 1–160(1922); *Physiol. Abstracts* **7**, 202.—If living parenchymatous tissues are left in distd. water, lipoids are given out into the water which presumably come largely from the walls themselves, as they are obtained before the protoplasts lose their turgescence. At 25° only water-sol. lipoids are obtained, giving clear aq. soln.; at 30° insol. lipoids are also obtained rendering the ext. opalescent. These substances can be pptd. from the ext. by $Pb(OAc)_2$. Full details are given of their chem. examn., by which the presence of fatty acids, phosphoric acid, glycerol, and N was established, and the conclusion reached that lipoids are present in these exts. and must form important constituents of the normal cell membrane. H. G.

Conphaseolin. A new globulin from the navy bean, Phaseolus vulgaris. H. C. WATERMAN, C. O. JOHNS AND D. B. JONES. *J. Biol. Chem.* **55**, 93–104(1923).—On heating a clear ext. of navy bean in 2% NaCl, 4 coagulation zones, 40–50°, 62–74.6°, 78.5–83° and 86–100°, were observed. The first was due to an albumin, for the filtrate from a dialyzed ext. gave only this one coagulation zone. By fractional pptn. with $(NH_4)_2SO_4$, there were obtained (1) a rather small first fraction at about 0.25 satn.; (2) an intermediate fraction, at 0.38–0.52 satn., apparently consisting of several proteins, with at least 3 coagulation zones, and (3) *phaseolin*, pptd. by 0.57 to 0.80 satn. The filtrate contained no heat coagulable protein. For the isolation of the *conphaseolin*, the bean meal was extd., with stirring, in 5 parts of 2% NaCl for 2 hrs. and was then mixed with paper pulp and pressed out. After filtering through paper pulp, $(NH_4)_2SO_4$ was added to 0.30 satn. The method of prepg. the α-globulin from the mung bean (*C. A.* **15**, 1152) was then followed. Most of it is denatured during the dialysis. The yield is about 0.35–0.40% of the dry wt. of the beans. Compn., C 53.81, H 6.86, N 15.73, S 1.36, O 22.24, amide N 7.39, humin N adsorbed by lime, 2.82, humin N in amyl alc. ext. 0.19, cystine N 0.88, arginine N 14.15, histidine N 1.47, lysine N 13.14, amino N in filtrate 57.53, non-amino N in filtrate 2.58%. *Phaseolin*, prepd. by the $(NH_4)_2SO_4$ pptn. method, had the compn. C 52.56, H 6.81, N 16.13, S 0.33, O 24.17% and yielded, on hydrolysis and analysis, amide N 10.95, humin N 0.71, cystine N 0.83, arginine N 12.57, histidine N 3.93, lysine N 11.10, amino N in filtrate 59.81, non-amino N in filtrate 0.18%. Since the S content of phaseolin, prepd. by dialysis, is 0.36%, it is believed to be more probably contaminated with conphaseolin than is that prepd. by pptn. with $(NH_4)_2SO_4$. I. GREENWALD

The influence of the gaseous and liquid media upon the development of carbon dioxide by dead plants. V. I. PALLADIN AND G. A. KAMENETZKII. *Bull. acad. sci. Russie* **1918**, 1307–8.—A series of expts. was undertaken to ascertain the role of gaseous media upon the velocity of CO_2 development by plants (seeds of pea and wheat) which were killed by antiseptics such as toluene, NaF, acetone, nitrobenzene, etc. This velocity was small and very rapidly decreased for plants placed in water; while the plants placed in air developed CO_2 at a far higher rate, and such as were placed in water, through which a slow stream of air was maintained, showed an intermediate behavior. Replacing the stream of air by H did not produce any substantial change, from which the authors conclude that a gaseous medium is necessary for a strong development of CO_2, but the nature of the gas is without influence, as it acts mechanically only. M. G. K.

Studies in plant respiration and photosynthesis. H. A. SPOEHR AND J. M. MCGEE. *Carnegie Inst. Publication* **325**, 1–98(1923).—The photosynthetic process is intimately

associated with the protoplasmic activity of the living cell and there may be an interdependence between photosynthesis and respiration. The important questions in both these processes are those relating to their dynamic aspects. In the plant cell the carbohydrates and fats serve as the fundamental sources of energy in respiration. Carbohydrates act as protein-sparers. With mature leaves of *Helianthus annus* the amino acid content of the leaves is higher than that of the stems, while the carbohydrate content is considerably higher in the stems. There is an accumulation of amino acids in the leaves in the dark, and there is some evidence that proteins diminish in the process. Amino acids have stimulating effects on certain enzymes and an increase of protein or of amino acids stimulates the total metabolism. The immediate cause of the *sp. dynamic action of amino acids* is not in the oxidation of amino acids and liberation of energy therefrom, but that the amino acids in some way stimulate the activity of the cells and cause them to metabolize more food material. An attempt to explain this by finding an isomerizing action on glucose to more rapidly metabolized isomers as is done by $Ca(OH)_2$, $Pb(OH)_2$, Na_2CO_3, etc., gave negative results. Fructose metabolizes more rapidly than glucose and while fructose showed relatively high respiratory activity, the leaves fed fructose had a depressed activity when amino acids were given. *Detns. of the rate of respiration* were made by drawing air free from CO_2 over the leaves and absorbing the CO_2 given off by the leaves in a standardized soln. of $Ba(OH)_2$. The *CO_2 was detd.* by titration of the $Ba(OH)_2$ soln. or preferably by detn. of the elec. cond. A curve of sp. resistance was drawn for definite concns. of $Ba(OH)_2$ soln. Complete descriptions and cuts of all app. are given. From 15 to 20 leaves were cut for each expt. One half was taken for immediate analysis and the rest analyzed after the respiration expt. Dry weight detns. were made in duplicate. The leaves were killed rapidly, dried, and powd. for analysis. The sugars, after hydrolysis with 1% HCl (which does not affect the cellulose) and neutralization with $NaHCO_3$, were detd. by a method outlined previously (*C. A.* **13**, 2386). The amino acids were extd. with hot water and detd. by the Van Slyke micro method. Deleano's statement (*Jahrb. wiss. Bot.* **51**, 552(1921)), that the nitrous acid method of detg. amino groups was unreliable when carbohydrates and nitrates were present in the mixture, was not confirmed. In order to give a comparison of excised leaves with the normal plant, the rate of respiration of an entire plant was detd. In the plant, changes due to exhaustion of carbohydrate content do not appear for a longer time, as there is a reserve in the stem and roots. A *Helianthus annus* plant was used. There was a gradual increase in the rate of respiration for the first 48 hrs.; probably the amino acids act in a stimulatory way, compensating the diminishing carbohydrate content. With excised leaves the rate drops rapidly from the very beginning with a slight rise at the 48th hr. There is a gradual depletion of carbohydrates and increase in amino acids. The stem and roots show a slight decrease in amino acids. In excised leaves carbohydrate decreases and amino acid increases. Excised leaves were placed in the dark in a N-free nutrient soln. contg. 7% of glucose. Sugar was taken up from the soln. and stored in the leaf and the amino-N content increased. Amino acids are produced in the dark and accelerate the rate of carbohydrate consumption. Leaves fed on glycocoll soln. consumed sugars more rapidly than leaves not so fed. The respiratory activity, as measured by CO_2 evolution, was likewise greater in leaves fed glycocoll. Leaves fed glucose kept an almost const. sugar content but increased 3-fold in amino acids. In this case the rate of respiration decreased regularly for the first 30 hrs. but then increased so that at the end of 80 hrs. it was slightly above the original rate. With Canada Wonder Bean leaves where the carbohydrate content and amino acid content increased during the expt., the rate of respiration after dropping to a min. at the end of 35 hrs. rose to above the original value. The minimum marks the point when amino acids have accumulated in sufficient quantity to influence respiration. When the leaves are fed amino acids in addition to sugar the rise in the rate of respiration is gradual from beginning to end. Other amino acids have a similar effect to that of glycocoll. *Effect of sugars on respiration.*—The behavior with sucrose was much the same but no influence of the amino acids was observed with levulose. There was a tremendous increase in amino acids and respiratory activity upon feeding it to the leaf. The feeding of glycocoll gave very little additional stimulation in this case. Excised leaves which had been kept in the dark for 40 hrs. (the minimum point on the respiration curve) gave an immediate increase in CO_2 emission on being fed glucose, which is not the case when leaves are given glucose immediately after cutting. The natural accumulation of amino acids is as effective in stimulating respiratory activity as when they are fed to the leaf. The rate of respiration has no direct relation to the carbohydrate supply. The effect of light is to decrease the amino acid content. Following a period of illumination there is a decreased rate of respiration

which increases slowly in darkness until the next period of illumination, when the petioles are immersed in sugar soln. Light affects the two factors governing respiration (carbohydrate and amino acid content) in an opposite manner. This may serve to keep the rate of respiration const. with varying external conditions. There is no accumulation of nitrates nor of ammonia in leaves kept in the dark for 95 hrs. The existence of an internal factor is postulated for such cases as where photosynthetic activity varies independently of external conditions. While the chlorophyll content regulates the degree of photosynthetic activity in leaves poor in chlorophyll, the limiting factor in leaves rich in chlorophyll is this internal factor, which behaves much like an enzyme and is responsive to temp. variation. If the actual chemical or energetic relationship exists between the photosynthetic and respiratory activities of the leaf it should be expected that any disturbance in the respiratory activity would be reflected in photosynthesis. In corroboration of this, reduced pressure and narcosis have been found to inhibit photosynthesis as well as respiration. A molecular relation between photosynthesis and respiration depends upon the activity of the intermediary products of sugar catabolism which react as building blocks with CO_2 or some of the primary products of its photochemical breakdown. This would account for asym. synthesis. For the study of this relation excised leaves of Canada Wonder Bean and sun flower were used. The method was based on the differential detn. of CO_2. Details of the app. are given. The rate of photosynthesis of a leaf, the store of carbohydrates of which has been greatly depleted, is initially low and rises with continued exposure to light. The respiration also shows an increased rate. Leaves previously kept in the dark show a continual decrease in respiratory activity and a declining photosynthesis. This also holds for high concns. of CO_2, *i. e.*, respiration parallels CO_2 fixation. Photosynthesis may be dual or coupled reaction. ARTHUR LOCKE

Biochemical study of the ripening of the kaki fruit. IV. Chemistry of the curing process. SHIGERU KOMATSU AND HIDENOSUKE UEDA. *J. Biochem.* (Japan) **2**, 309–13(1923).—The extensive analytical data from the study of a sweet fruit variety and 2 cured varieties must be consulted in the original. The changes broadly are these: in the cured fruit (either by the dry or wet method) the acidity and the sol. tannin content diminish markedly. The reducing-sugar content is also decreased, especially in the desiccated fruit. It is probable that in the ripening of the sweet fruit and in the curing of the astringent fruit the sol. tannin disappears, and the glucose-fructose ratio changes in such manner that the content of fructose becomes higher. S. M.

The regulation of osmotic pressure in the guard cells of the air and water stomata. ANNA L. STEINBERGER (NÉE HURT). *Biol. Zentr.* **26**, 405–19(1922).—The previous findings of Iljin (*C. A.* **10**, 1367) and of Wiggans (*C. A.* **15**, 1743) in regard to the definite relationship existing between the osmotic pressure in the guard cells of stomata and the regulation of the stomata are confirmed. It was furthermore found by S. that when leaf sections are placed for several days in H_2O the stomata reopen not because of a rise of pressure in the guard cells, but as a result of the cessation of counter-pressure in the adjacent epidermal cells of the dying leaf-tissue. In amylophylic plants the rise of osmotic pressure is parallel to a solution (hydrolysis) of the starch, and conversely, lowering of the pressure is accompanied by regeneration of starch. On the other hand in the saccharophylic species (*Allium*) variations in osmotic pressure of the cells occur without any observable variation in their starch content. W. A. PERLZWEIG

Respiratory system of plants. METHODI POPOFF. *Compt. rend.* **176**, 594–6(1923).—Analogous to the respiratory and circulatory systems in animals is the distribution of O and of solns. of mineral salts in plants. L. W. RIGGS

New researches relating to the presence of loroglossin in indigenous orchids. P. DELAUNEY. *Compt. rend.* **176**, 598–600(1923); cf. *C. A.* **15**, 546, 2292, 4018; **16**, 1447.—A cryst. glucoside identified as loroglossin was isolated from *Epipactis latifolia* All., *E. atrorubens* Hoffm., *Ophrys muscifera* Huds., *Orchis pyramidalis* L., *O. conopsea* L., *O. purpurea* Huds., *O. Morio* L., *O. maculata* L., *O. latifolia* L., *O. mascula* L., and *O. militaris* Huds., making 17 species from 5 genera from which loroglossin has been isolated. It is notewrothy that loroglossin has been isolated from plants so unlike in their vegetative parts as *Orchis*, *Ophrys*, and *Loroglossum* on the one hand, and *Cephalanthera* and *Epipactis* on the other. L. W. RIGGS

Necrobiosis of vegetable protoplasm studied by aid of a new vital reagent. PAUL BECQUEREL. *Compt. rend.* **176**, 601–3(1923).—Studies were made on the outside scales of the bulb of *Allium Cepa*. The reagent is composed of a mixt. of methylene blue 2 parts, Bismarck brown 1, and neutral red 1; each of the dyes is in 1 : 10000 aq. soln. and the mixt. is made at the time of use. When successfully stained the vegetable cell shows a triple coloration. The membrane is green; the protoplasm and nucleus pale are

yellow; the vacuole is rose brown and the spherical microsomes are greenish translucent. Immediately upon death from any cause the aspect of the cell rapidly changes. The nucleus changes from pale yellow to green with brown spots, the 2 nucleoli become bluish, the cytoplasm takes a greenish blue tint more slowly while the large vacuole seems to have disappeared, its colored juice having been absorbed by the cytoplasm. These changes of color indicate the passage from life to death, and are always accompanied by an irreversible colloidal transformation of the fundamental substances of the cytoplasm and nucleoplasm. This transformation may be shown either by means of vital staining or the ultramicroscope. L. W. RIGGS

Internal decline of lemons. II. Growth rate, water content, and acidity of lemons at different stages of maturity. E. T. BARTHOLOMEW. *Am. J. Bot.* **10**, 117–26(1923).—Size of the lemon is not necessarily proportional to the % of H_2O it contains. Mature lemons vary from 88.2% to 92.14% H_2O. The total acid in lemons increases rapidly as it approaches maturity; the true acidity increases very little after the lemon has reached a diam. of about 3.8 cm. The av. of a large no. of stylar and stem ends of normal lemons shows the mean acidity to be substantially the same for each. J. J. S.

Presence of β-hydroxyglutamic acid in proteins of soy bean. MOTOI ONUKI. *J. Chem. Soc.* (Japan) **43**, 737–43(1922).—Powd. soy bean was freed from fat, and the proteins were extd. and pptd. in the usual way. 100 g. of this dried protein were hydrolyzed, and fractionated by the BuOH method of Dakin. From the BuOH-insol. fraction, aspartic acid and hexose bases were removed, and from the filtrate, 5.47 g. of crude β-hydroxyglutamic acid were obtained. It forms shapeless crystals, sol. in H_2O, and in AcOH, sparingly in MeOH, insol. in alc., Et_2O and AcOEt, and tastes very sweet. Aq. soln. is slightly dextrorotary. It was identified by the ozazone test (m. 283°), prepd. by first oxidizing with chloramine-T and treatment with *p*-nitrophenylhydrazine. Its color reactions were: red with diazo reagents and various colors with different phenol derivs. In which of the soy-bean proteins, this amino acid occurs, and exactly how much, have not been detd. S. T.

Microchemistry of the flavones of the Primulas. H. BRUNSWIK. *Sitz. Akad. Wiss. Wien. Abt. I* **131**, 221–32(1922).—Microchem. tests for the flavone, $C_{15}H_{10}O_2$, found in the powdery secretion on the hairs of the plant, were worked out on 25 species of Primula. It is characterized by the following reactions: 1, crystn. from hot concd. HCl under the cover glass; 2, formation of luminous, blue needles in tufts or mats, insol. in 50% HCl, by means of I–KI in alc.; 3, strong adsorption of I by crystals of the flavone, the latter becoming blackish; 4, formation of a needle- or tendril-shaped, colorless sublimate, which retains the above iodine reactions; 5, blue fluorescence in concd. H_2SO_4 soln. J. J. WILLAMAN

Hydrocyanic acid in *Phaseolus lunatus* and other beans (SERRANO) **12**.

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E—NUTRITION

PHILIP B. HAWK

NORMAL

Growth and reproduction upon simplified food supply. II. Influence of food upon mother and young during the lactation period. H. C. SHERMAN AND M. MUHLFELD. *Proc. Soc. Exptl. Biol. Med.* **19**, 76–7(1921); cf. *C. A.* **16**, 3504.—Increasing the amt. of whole milk powder from 1/6 to 1/3 of a diet of milk powder and ground whole wheat caused an increase in the no. of young rats produced, an increase in the no. successfully suckled and a better maintenance of body wt. by the mother. C. V. B.

The food value of the seeds of Lathyrus cicera. II. SABATO VISCO. *Arch. farm. sper.* **35**, 39–48(1923).—White rats were maintained for periods as long as 80 days on an exclusive diet of the seeds of *Lathyrus cicera*. They showed a plus N balance and a gain in wt. of as much as 50 g., and appeared normal in every respect. A. W. D.

Influence of vitamin-free diet on the blood of growing rats. E. WEITBRECHT. *Arch. Kinderheilk.* **71**, 192–208(1922); *Physiol. Abstracts* **7**, 501.—Rats fed on a basal diet free from vitamin and fat (ground diet) live for a certain time. The duration of the life is diminished by the addn. of fat and their loss of weight is almost 4 times as great as that of the animals of the same age fed on the basal diet. The latter suffer from a simple anemia of the chlorotic type; the anemia of the animals fed with fat plus basal diet is of a more dangerous character (aplastic form). H. G.

Action of autolyzed extracts of unpolished seeds on pigeons on a vitamin-free

diet. E. LOCATELLI. *Arch. sci. biol.* **3**, 307(1922); *Physiol. Abstracts* **7**, 438.—The administration of an autolyzed ext. of unpolished rice (eutonin) to pigeons kept on polished rice prolongs their life and prevents the manifestation of nerve troubles, but the animals diminish in weight and in the end die in the same way as the untreated controls. H. G.

Basal metabolism. E. P. CATHCART. *Brit. Med. J.* **1922**, ii, 747–50; *Physiol. Abstracts* **7**, 498.—The endogenous products in the urine represent the effects of the metabolism of the sarcoplasm of the muscles, *i. e.*, they are the metabolic products associated with "tonus." H. G.

Production of digestive leucocytosis. I. C. CIACCIO. *Hematologica* **3**, 1–14 (1922); *Physiol. Abstracts* **7**, 433.—A leucocytosis occurred 30 mins. after the introduction of 4% HCl into the stomach of fasting dogs, reached a max. in about 1 hr., then diminished and disappeared between the 2nd and 5th hr. In some expts. it was preceded by a leucopenia. Digestive leucocytosis is, therefore, not due to the digestion of proteins, but to the HCl secreted by the stomach. H. G.

Utilization of carbohydrates and fat by children fed on a "butter-meal" diet. M. ZEILASKOWSKI. *Jahrb. Kinderheilk.* **97/47**, 330–40(1922); *Physiol. Abstracts* **7**, 247.—The absorption of the carbohydrates is excellent, and so is the assimilation of fat. A sufficient retention of N was found also. H. G.

The relation between food and thyroid. K. TSUJI. *Nihon Naikagakkwai Zasshi* **9**, No. 5; *Japan Med. World* **2**, 45(1922); *Endocrinology* **6**, 587.—T. previously dealt with a substance in raw cow milk which acted as a hormone on the thyroid. Egg yolk and butter caused an increase in the weight of the thyroid, and an increased function and histological glandular structure. Feeding with a mixt. of pure albumin, carbohydrate, fat and salts caused atrophy of the thyroid with corresponding relative effects on other organs. He concludes that egg yolk and raw milk contain substances which stimulate the thyroid. H. G.

Vitamins as medicine for children. E. GLANZMANN. *Schweiz. med. Wochschr.* **1922**, 57–61, 84–9; *Physiol. Abstracts* **7**, 436.—A review with bibliography. H. G.

Content of blood in creatine and creatinine. A. SLOSSE. *Soc. roy. sci. méd. nat. Bruxelles, Vol. jubilaire* **1922**, 155–62; *Physiol. Abstracts* **7**, 493.—The creatine content of blood studied during the years of famine was less than that of normal blood. The amt. of creatinine was also slightly diminished. This diminution is attributed to the restriction of meat consumption. H. G.

Unit of energy metabolism and active mass of the organisms. ÉMILE-F. TERROINE, A. FEURBACH AND E. BRENCKMANN. *Compt. rend.* **176**, 462–4(1923).—Exceptions are taken to the law of surfaces. Detns of N in various animals fail to show any relation between the intensity of metabolism and the N content of the animal. L. W. RIGGS

Nutritional system of the central nervous system as shown by the chloride method. FRANZ GROEBBELS. *Arch. ges. Physiol.* (Pflüger's) **193**, 128–70(1922). G. H. S.

Uric acid excretion on a purine-free diet. H. STEUDEL. *Z. physiol. Chem.* **124**, 267–73(1923).—The uric acid excretion varied greatly on different days, and was due to conditions in the alimentary tract. When the feces indicated unusual fermentation the uric acid excretion was low. R. L. STEHLE

Nutritive values of lipoids. IV. Separation and identification of active principle (vitamin A) of cod-liver oil. K. TAKAHASHI. *Proc. Japn. Chem. Soc.; J. Chem. Soc.* (Japan) **43**, 828–30(1922).—By the following method of extn., T. obtained a semi-cryst. active principle of cod-liver oil (0.1% yield), which in 1 in 10000 restores the life of an animal dying from lack of vitamin A. Cod-liver oil is sapond. with alc.-KOH. The alc. filtrate is treated with $CaCl_2$-alc. soln. and the filtrate is satd. with CO_2. The filtrate is freed from alc. and treated with Et_2O. The Et_2O filtrate is treated with K_2CO_3 and H_2O. The Et_2O layer is freed from Et_2O and extd. with MeOH. The final filtrate contains cholesterol and the active principle. The purified principle is sol. in alc., Et_2O and the other org. solvents, but insol. in H_2O, forming only an emulsion. It is stable in alk. soln.; $CHCl_3$ soln. gives a typical color reaction characteristic of lipochrome, with concd. HNO_3; it contains no N, P, nor halogens, but has C, H and O. It does not form acetates, does not absorb Br, but reduces ammoniacal Ag, Fehling and phosphomolybdate solns. It is unstable in the presence of sunlight and air, taking up O_2, increasing in wt., and losing reducing power. Loss of H_2SO_4 reaction indicates destruction of the active principle. It is one of the aldehyde compds. More detailed chem. compn. will be reported later. S. T.

ABNORMAL

Mineral requirements of dairy cows. E. B. MEIGS. *J. Dairy Sci.* **6**, 46–53(1923).—A review of the Ca and P deficiencies in the ration of stall-fed dairy cows. Ca deficiency can be avoided by feeding alfalfa and P by adding $NaHPO_4$ to the feed.
H. V. ATKINSON

Growth and nutrition of dairy cows. V. Milk as the sole ration for calves. A. C. MCCANDLISH. *J. Dairy Sci.* **6**, 54–66(1923).—Two bull calves were fed on milk alone from birth until their death at 180 and 172 days, resp. Body wts. and measurements at intervals are given. Whole milk does very well as the sole ration of calves up to 3 months of age but no longer. This is due to insufficient bulk in diet, excessive salts intake due to depraved appetite or insufficient water-sol. B and C vitamins.
H. V. ATKINSON

The acetonuria produced by diets high in fat. R. S. HUBBARD AND F. R. WRIGHT. *Proc. Soc. Exptl. Biol. Med.* **19**, 91–2(1921).—Diets consisting of 10% protein, 10% carbohydrate and 80% fat were given to normal and arthritic subjects and the degree of acetonuria was detd. The results indicated that ketogenic and antiketogenetic compds. strike a mol. balance, that protein enters into the reaction only to the extent of the glucose obtainable from its α-amino acids; that the glycerol radical of fat was antiketogenic to the extent of its yield of glucose. C. V. B.

Is there more than one kind of rickets? E. A. PARK, P. G. SHIPLEY, E. V. MCCOLLUM AND N. SIMMONDS. *Proc. Soc. Exptl. Biol. Med.* **19**, 149–54(1921).—When the young rat is deprived of certain active light rays and an unidentified factor contained in cod-liver oil, rickets can be produced (1) by diminishing the K in the diet and supplying the optimum of Ca, and (2) by reducing the Ca and supplying the optimum of K. Variations in the Ca-K ratio produce varying rachitic symptoms. The rickets of children associated with severe nephritis is probably one of low Ca, the K not being excreted by the diseased kidneys. C. V. B.

The effect of cooking upon the antiscorbutic vitamin in cabbage. W. H. EDDY, E. SHELOW AND R. A. PEASE. *Proc. Soc. Exptl. Biol. Med.* **19**, 155–60(1921).—Rats fed the Le Mer-Sherman basal diet were protected against scurvy by the addn. of 1 g. of raw cabbage daily; 10 g. of cooked cabbage afforded no protection. C. V. B.

Cod-liver oil and rickets. T. F. ZUCKER, A. M. PAPPENHEIMER AND M. BARNETT. *Proc. Soc. Exptl. Biol. Med.* **19**, 167–9(1921).—The antirachitic substance of cod-liver oil is found in the ether-sol. "unsaponifiable" fraction after alk. hydrolysis. It is not an org. base of the type described as occurring in cod-liver oil, nor is it cholesterol. It may be a sterol related to cholesterol or a cholesterol deriv. The fatty acids of cod-liver oil are entirely inactive in curing rickets. C. V. B.

Vitamin A in oranges. T. B. OSBORNE AND L. B. MENDEL. *Proc. Soc. Exptl. Biol. Med.* **19**, 187–8(1922).—Rats given a diet which produced ophthalmia from lack of vitamin A were completely cured within a few days by 5 cc. of orange juice either fresh or desiccated. Normal growth was restored by 10 cc. daily. Orange juice contains vitamins A, B and C which can possibly be conserved by suitable processes of desiccation. Per volume, orange juice is as rich as milk in vitamin B, less rich in vitamin A, and much richer than milk in vitamin C. C. V. B.

The feeding of non-ketogenic odd-carbon fats to diabetic patients. MAX KAHN. *Proc. Soc. Exptl. Biol. Med.* **19**, 265–6(1922).—Synthetic fat contg. fatty acids of odd carbon numbers was fed to typical diabetic and ketotic patients; large quantities were absorbed without a resulting acidosis; nutrition was improved. C. V. B.

Preparation of an antiscorbutic product and the function of vitamin A in experimental scurvy. N. BEZSSONOV. *Bull. soc. hyg. aliment.* **11**, 14–38(1923).—A material rich in vitamin C (called "product C") was prepd. as follows: fresh cabbage juice, extd. by means of a hydraulic press, was immediately defecated with neutral $Pb(OAc)_2$, excess Pb was pptd. with H_2S, and the filtrate was concd. *in vacuo* at 35° to a sirupy consistency (40–50% H_2O). The concd. juice was dried over H_2SO_4 under a bell jar at 35° to a yellowish white powder (yield 2.5% on the original juice). Various batches prepd. from Dec. to Feb. and May to Aug. gave N 2.64–2.65% (*via* Kjeldahl), reducing sugars 33–46%, total sugars 52–65%, ash about 7.5%, fat none, proteins none. Aq. solns., even concd., were quite clear. Expts. with guinea pigs, which are described in detail, led to the following conclusions. A 0.1 g. dose of "product C" per animal prevented scurvy. The min. dose required to sustain life was not detd. but must be appreciably lower than 0.1 g. The noxious action of cod-liver oil, observed by Mouriquant and Michel (*C. A.* **16**, 3328), was confirmed. It is probably due to the excess of the anti-rickets portion of fat-sol. A (as distinct from the anti-xerophthalmic portion),

which is not tolerated by guinea pigs when there is a deficiency of antiscorbutic factor. Hypertrophy of the testicles and prolonged erection of the penis in subjects deprived of antiscorbutic factor tend to show that the latter affect the sexual function.
A. PAPINEAU-COUTURE

The vitamin action of thermostable substances. PIETRO DI MATTEI. *Arch. farm. sper.* **35**, 5–30(1923).—Pigeons, which were reduced to an advanced stage of polyneuritis by feeding an exclusive diet of polished rice, showed marked recovery when an infusion of roasted coffee was added to the ration. Raw coffee and pure caffeine were without effect.
A. W. DOX

Value of seeds of Ervum ervilia. I, II, III. S. VISCO. *Atti. accad. Lincei* **30**, 241–4, 276–9, 379–84(1921); *Physiol. Abstracts* **7**, 503.—The disease produced by eating these seeds is a deficiency disease, and is cured by giving a food contg. vitamin. An analysis is given showing that Ervum meal is deficient in certain essential amino acids.
H. G.

Eczema in breast-fed infants as a result of sensitization to foods in the mother's dietary. W. R. SHANNON. *Am. J. Diseases Children* **23**, 392–405(1922); *Expt. Sta. Record* **47**, 370–1.—Cutaneous tests with proteins occurring in the diet of the mother have shown the infants to be sensitive to several of these proteins. Removal of the offending foods or limiting the amts. eaten has in all cases resulted in marked improvement in the urticaria, while a return of the trouble has almost invariably come through failure of the mother to continue the dietary restriction. "As general prophylactic measures it is recommended that all mothers be cautioned to eat a large variety of foods and a small quantity of any individual article of diet, that eggs be restricted rather than forced in the diet of the mother, and that all cases of eczema be studied early and offending foods eliminated before sensitization becomes so widespread as to make proper limitation of diet impossible."
H. G.

The vitamin requirement of various species of animals. III. The production and cure of xerophthalmia in the suckling. V. E. NELSON, A. R. LAMB AND V. G. HELLER. *Am. J. Diseases Children* **23**, 518–20(1922); *Expt. Sta. Record* **47**, 862; cf. *C. A.* **16**, 2715.—Striking evidence of the extra need of vitamin A for reproduction and lactation is presented. Six rabbits, five male and one female, were placed when about ¾ grown on a diet low in vitamin A; the diet consisted of white corn 55, linseed oil meal 22, oats 15, meal meat tankage 5, and supplementary salt mixt. 3 parts. The animals gained in weight and appeared to be in excellent nutritive condition. After about 3 months the female gave birth to 5 young. Soon after the birth of the young the mother began to lose in weight and developed signs of xerophthalmia. Two of the young died before the eyes were opened. One died in a little over two weeks with typical symptons of xerophthalmia, and the two remaining showed signs of it. On the addn. of from 1 to 2 g. of butter fat to the mother's diet, the xerophthalmia in the mother cleared up slowly and the young showed marked improvement in the eye condition. One had, however, become so weak that it died 3 days later, but the other began to grow rapidly, doubling its weight in the next 13 days.
H. G.

Pathogenesis and treatment of rickets. I. JUNDELL. *Hygiea* **83**, 753–76(1921); *Expt. Sta. Record* **47**, 467.—Rickets is considered due to overnutrition with the consequent interference of the functioning of the cells. Remarkable results are reported in the treatment of infantile rickets by relative inanition, either alone or supplemented with cod-liver oil and P. Overfeeding treatment with cod-liver oil does not prevent the development of rickets. A no. of cases are reported showing the details and results of the treatment recommended. The total intake of calories is reduced to 65–70 per kg. of body weight per day from a normal of about 100 calories. Not more than 60–75 cc. of milk is allowed per day per kg. To this are added sugar and flour to bring the calories to the proper amt. or potatoes or porridge for older children.
H. G.

Functions of the thyroid with special reference to the relation to diet. K. TSUKI. *Igaku Chuwo Zasshi* (Tokyo) No. **352**; *Japan Med. World* **1**, 25(1921); *Endocrinology* **6**, 587.—Animals were fed food deficient in vitamin and their development and state of nutrition were observed during the winter. Deterioration of, as extirpation of, the thyroid resulted in stunted growth or emaciation and a remarkable change in the alimentary and genital glands. Vitamin deficiency caused stunted growth or emaciation with deranged thryoid function, though it was still in an active state. The glandular organs underwent changes similar to those following thyroid extirpation. Conclusion: Vitamins in the food have a hormone-like action upon the thyroid.
H. G.

Beriberi-like disease in mammalian animals. M. MURATA. *Japan Med. World* **1**, 12–4(1921); *Expt. Sta. Record* **46**, 668.—A considerable proportion of rabbits fed

polished or unpolished rice, rice straw, and water lose weight and after about 80 days develop paralytic and other nerve symptoms similar to beriberi and die within a few days. On autopsy these animals, as well as others which died without the nerve symptoms, showed general atrophy of the organs, particularly the thymus, pancreas, and the generative organs; hypertrophy of the cortex of the adrenals; and occasionally cirrhosis of the liver. The nerves and muscles of the animals dying with characteristic beriberi symptoms showed retrogressive changes. After the onset of nerve symptoms, recovery following feeding of vitamin-rich food was slower than with pigeons, requiring generally about 10 days. M. thinks the beriberi-like disease in rabbits resembles human beriberi rather than avian, in that it is brought about by partial rather than complete lack of vitamin B. H. G.

Beriberi-like disease in mammalian animals. S. OSEKI. *Japan Med. World* **1**, No. 3, 6–11(1921); *Expt. Sta. Record* **47**, 268–9.—A continuation of the studies on vitamin B previously noted (cf. preceding abstr.). The essential difference between human beriberi and avian polyneuritis is that the former is a hypovitaminosis and the latter an avitaminosis, *i. e.*, the former is the result of an insufficiency and the latter a complete lack of vitamin B. H. G.

Relations between the chemistry of the body and tetany. A. ORGLER. *Klin. Wochschr.* **1**, 1023; *Münch. med. Wochschr.* **69**, 451(1922); *Endocrinology* **6**, 724.—Tetany of infants largely depends on the food. K and P increase the symptoms; Ca and Mg have a good influence. In many cases the Ca balance is negative. The Ca content of the blood is low. Parathyroid tetany, guanidine tetany and spontaneous tetany of infants all show the same type of Ca metabolism. H. G.

B vitamin and pneumococcal infection. G. M. FINDLAY. *Lancet* **1922**, I, 714–5; *Expt. Sta. Record* **47**, 368.—The decreased resistance to infection resulting from a diet deficient in vitamin B may be due in large part to the lowering of body temp. resulting from this deficiency. To test this hypothesis, 4 pigeons were placed on a diet of polished rice until their temp. was reduced to between 103° and 104° F. after from 21 to 26 days. They were then inoculated intraperitoneally with agar cultures of pneumococcus, and 64 control pigeons were similarly inoculated. The control pigeons remained well, while those on the polished rice diet died in from 9 to 36 hours after the inoculation without showing any symptoms of paralysis. On autopsy the pneumococcus was isolated in all four cases from the abdominal cavity and heart blood, while the same organs of two of the control pigeons killed 36 hours after the injection were sterile. Further expts. are being conducted on the resistance of pigeons on deficient diet to other species of bacteria. H. G.

The etiology of scurvy. III. The effect of neutralization on the antiscorbutic vitamin. E. B. VEDDER. *Mili. Surg.* **49**, 502–12(1921); *Physiol. Abstracts* **7**, 364.—Antiscorbutic vitamin is neither an acid nor a salt, and when sepd. from acids or salts retains its preventative and curative power. But neutralized orange or lemon juice diluted with alc. is effective only in the fresh condition. Heated neutralized juice is damaged, but not destroyed entirely. H. G.

Vitamins and diabetes. KLOTZ AND HÖPFNER. *Münch. med. Wochschr.* **69**, 465–6(1922); *Endocrinology* **6**, 679.—Vitamins influence metabolism. The Ca metabolism in rickets is improved when fresh exts. from sweet potatoes, turnips or carrots are given. It was found that exts. from sweet potatoes in not too large quantities diminished the sugar in the blood and urine, but yeast had no influence. However, Borutteau (*C. A.* **13**, 2065) proved by much more extensive expts. the existence of antidiabetic substance in these vegetables and in yeast also. H. G.

Factors in development of diabetic acidosis. PETRÉN. *Münch. med. Wochschr.* **69**, 797; *Klin Wochschr.* **1**, 1280(1922); *Endocrinology* **6**, 683.—In health as well as in diabetes, acidosis is caused by a lack of carbohydrate in the diet. In diabetes, however, acidosis occurs also when the patient takes more than a certain amt. of N in the form of proteins. Proteins raise the blood sugar; fats have no influence. H. G.

Importance of different vitamins on the immunity defense of some organisms. M. D'A. BIONDO. *Policlinico* **29**, 3–5(1922); *Physiol. Abstracts* **7**, 361.—An investigation of the effect on partial vitamin-starvation on immunity to splenic disease in pigeons. The following results were obtained. With lack of all 3 factors, of A + B, B + C, or B alone, the pigeons died between the 15th and 24th days of polyneuritis; during this time the immunity against splenic disease was lost, and the pigeons died, when infected after 8 days, within 38 to 95 hrs. of septicemia. In absence of A + C as of A or C alone the immunity is not lost. H. G.

The influence of vitamin A on the blood platelets of the rat. S. P. BEDSON AND S. S. ZILVA. *Brit. J. Exptl. Pathol.* **4**, 5–12(1923).—Young growing rats fed on a diet

deficient in vitamin A show a lower platelet count than do normal rats of the same age. The greatest diminution in the platelet count was 244,000, representing a 21.3% reduction. It is possible that this minimal change in the platelet count could be brought about by other dietetic deficiencies and is not to be regarded in the light of a specific lesion due to a deficiency of vitamin A. HARRIET F. HOLMES

Beriberi: Some facts and the possible hypotheses. TSANG G. NI. *J. Lab. Clin. Med.* **7**, 340–8(1922).—A discussion of theories on the etiology of beriberi. Disturbance of vitamin metabolism is one, if not the only one, factor causing beriberi. Other theories on etiology have been disproved by expt. E. R. LONG

Effect of an antiscorbutic preparation on guinea pigs. N. BEZSSONOV. *Compt. rend.* **175**, 846–8(1922).—In a closed app. which allowed manipulation in the absence of O, an antiscorbutic was prepd. from cabbage. The juice was extd. by pressure, was defecated with $Pb(AcO)_2$, the Pb removed by H_2S and the liquid evapd. *in vacuo* at 35° to a sirup and further evapd. *in vacuo* over H_2SO_4 to a dry yellowish powder. The yield was 2.5% of the cabbage juice. This product, which will be designated by *C*, is very hygroscopic, total N 2.64%, total sugars in different samples ranged from 52 to 65%, ash about 7.5%. *C* contains neither fats nor proteins. It gives the intense blue reaction characteristic of antiscorbutic and of *o*- and *p*-diphenol. Guinea pigs fed on a ration deprived of antiscorbutics received 0.1 g. of *C* per animal per day. Generally the animals received 2 or 3 drops of cod-liver oil daily. Three tests were made with 14 animals besides the controls. Cod-liver oil in doses of 70 mg. per day has a harmful action on guinea pigs, which may be counteracted by a strong dose of *C*. The quantity of antiscorbutic in 0.1 g. of *C* was proved sufficient for the normal growth of guinea pigs up to 600 g. L. W. RIGGS

Utilization by the organism of vitamin C introduced by the parenteral route. ED. LESNE AND M. VAGLIANOS. *Compt. rend.* **176**, 614–5(1923).—Pregnant or recently delivered female guinea pigs were studied in order to observe the effects of the vitamin on the fetus and on lactation. The juice of ripe oranges was collected aseptically, held at 90° for 2 min. and used fresh, being made faintly alk. with NaOH at the time of injection. Each animal was fed rations lacking vitamin C which would have caused death with scorbutic symptoms in 3 or 4 weeks. Each day the animal received, subcutaneously if during pregnancy, or intraperitoneally if after delivery, 3 cc. of the orange juice. In every case the animals remained in perfect health for the duration of the expt. or for 55 to 60 days. The antiscorbutic action of vitamin C is, therefore, independent of the route of its introduction. L. W. RIGGS

Undernutrition and its influence on the metabolic plane of steers. F. G. BENEDICT AND ERNEST G. RITZMAN. *Proc. Nat. Acad. Sci.* **9**, 23–5(1923).—During the last few weeks of a 4.5-mo. period on a ration of approx. 0.5 their original maintenance requirement body wts. of the steers remained nearly const. The amt. of H_2O consumed per kg. of water-free substance in the feed was about 2.5 kg. instead of 4 or 5 kg. The energy of the feces averaged 5.21 cal. per g. of water- and ash-free substance. While the underfed animals were not as lively as the controls they showed decided activity. Pulse rates decreased from an av. of 44 to an av. of 28 beats per min. Metabolism measurements under standard (but not basal) conditions showed a maintenance level of 2150 cal. per sq. m. of body surface. The undernourished animals showed a low metabolic level of 1475 cal. Upon realimentation the level was raised to 2200 cal. With certain of the steers complete N balances were obtained. From data detd. it is estd. that these steers went through the winter of 140 days with a loss of 1300 g. of N and approx. 52 kg. of fat. Apparently the steers were not injured by the underfeeding as they were afterwards readily fattened for market. L. W. RIGGS

Blood gas analysis in disturbed tissue respiration; the nature of avian beriberi. ALFRED FLEISCH. *Arch. exptl. Path. Pharmakol.* **95**, 17–35(1922).—The expts. were designed to test the hypothesis of Hess regarding the relationship of the essential mechanisms of avitaminosis and HCN intoxication. In KCN intoxication, as in avitaminous pigeons, the venous blood is extremely bright red in color, as compared with the normal appearance. The difference in the O_2 content between arterial and venous blood is reduced about one-half, both in avitaminous animals and in KCN intoxication; the arterial blood is almost completely satd. with O_2. The venous blood has also an abnormally high content of O_2. The action of the heart and the frequency of respiration are markedly reduced in both the intoxication and the avitaminosis. These physiol. effects, as well as the reduced hemoglobin seen in avitaminosis, are under otherwise normal conditions, associated with a low O_2 content of the venous blood. In both KCN poisoning and avitaminosis, there appears to be a reduction of oxidase function. G. H. S.

Auto-immunization against deficient diets. G. MOURIQUAND AND P. MICHEL.

Compt. rend. **174**, 1639–42(1922).—In scurvy of the chronic type periods of freedom from the symptoms of the disturbance sometimes occur, unassociated with any change in diet. These periods of apparent recovery are of variable duration and are to be noted only in animals which are upon partially deficient diet; diets possessing multiple deficiencies do not permit the phenomenon of "auto-immunization," nor does it ever appear in the acute disturbances. G. H. SMITH

The formation of a conjugated glucuronate after the administration of elbon. K. MORINAKA. *Z. physiol. Chem.* **124**, 247–52(1923).—Elbon is cinnamoyl-*p*-hydroxyphenyl urea. After feeding 2 g. per day to rabbits $NH_2CONHC_6H_4O.CH.CH(OH):CH(OH).C$-$\underset{\text{O}}{\text{H}}$.CH(OH)COOH was excreted in the urine. This compd. m. 231° (decompn.), is sol. in H_2O, insol. in alc. and Et_2O and does not reduce Fehling soln. By acid hydrolysis *p*-aminophenol is formed. R. L. STEHLE

F—PHYSIOLOGY

ANDREW HUNTER

On the relation of blood volume to the nutrition of the tissues. I. The effects of hemorrhage and intravenous injections of gum saline on the response to the administration of a mixture of carbon dioxide and room air, and of room air alone. ROBERT GESELL, C. S. CAPP AND F. S. FOOTE. *Proc. Soc. Exptl. Biol. Med.* **19**, 54–6(1921); cf. *C. A.* **16**, 3508.—Dogs under morphine-ether and morphine urethan anesthesia were used. The addition of 5% CO_2 to room air increased the ventilation rate; hemorrhage of 1% of the body wt., or less, greatly augmented the response to CO_2, which returned to the prehemorrhage rate when gum saline was injected. The results are attributed to changes in the vol. flow of blood. **II. The effects of hemorrhage and subsequent injections of gum saline upon the volume flow of blood through the striated muscle of the dog.** ROBERT GESSEL. *Ibid* 56.—The vol. flow of blood was studied by the drop method. In many animals hemorrhage amounting to 1% of body wt. markedly decreased the flow, which subsequently was disproportionately increased by injecting a 6% suspension of gum in 0.9% NaCl soln. **III. The effects of hemorrhage and subsequent injection of gum saline upon the response of the sartorius muscle of the dog to rapid electrical stimulation.** ROBERT GESELL. *Ibid* 56.—Hemorrhage amounting to 1% of the body wt. decreased the response of the mucle to stimulation; subsequent injection of gum saline improved the response. **IV. The effects of hemorrhage and subsequent injection of gum saline on total oxygen consumption.** ROBERT GESELL, C. S. CAPP, AND F. S. FOOTE. *Ibid* 57.—O_2 consumption decreased in proportion to the amt. of hemorrhage. Injection of gum saline increased the O_2 consumption, which was most marked immediately after the injection. C. V. BAILEY

The velocity of development of the demarcation current in the frog's sartorius. G. E. FAHR. *Proc. Soc. Exptl. Biol. Med.* **19**, 142–4(1921).—The demarcation current developed in the frog's sartorius as a result of injury can be inhibited or have its sign reversed by using K in place of Na in the surrounding fluid; the potential has a quantitative relation to the K ions. The current is attributed to the rapid K-ion equilibration at the cut surface while the uncut surface is under ion strain; this current should be of max. intensity in 1/100,000 sec. An expt. using a rifle bullet for timing and production of injury, and galvanometers and a hymographion carrying film detd. that the demarcation current was established with its maximum value within 1/10,000 of a sec.; this favors the ion theory of the current production. C. V. B.

The distribution of inorganic phosphate of the blood between plasma and cells. T. F. ZUCKER AND M. B. GUTMAN. *Proc. Soc. Exptl. Biol. Med.* **19**, 169–71(1921).—By working rapidly with the Bell and Doisy method, the inorg. phosphate found in the plasma is the same as that of whole blood. If the colorimetric reading is made within 0.5 hr. after the blood is drawn, the distribution is equal; if 1 hr. elapses, the whole blood contains more than the plasma; after several hrs. the difference is still greater. Phosphate ions freely permeate the cell wall, and are stored as org. acid-sol. phosphate; the latter in turn is readily hydrolyzed when there is need of phosphate ions in the plasma. C. V. BAILEY

The acid-base equilibrium of the blood following vigorous muscular exercise. D. P. BARR. *Proc. Soc. Exptl. Biol. Med.* **19**, 179–80(1922).—Four normal subjects did 3500 kg.-m. of work on a Krogh bicycle ergometer in 3½ mins. Arterial blood was obtained immediately before and 3 min. after the exercise; its CO_2 content and CO_2 absorption curve were detd. by the method of Henderson and Haggard and the reaction was calcd. from the $H_2CO_3/BHCO_3$ ratio after the formula of Hasselbalch. In all cases

there was a marked reduction in the bicarbonate content. The CO_2 tension was 1.5 to 12 mm. lower after exercise. The p_H reduction varied from 0.09 to 0.27. In 1 observation the blood had regained its normal p_H 8 mins. after exercise but the bicarbonate content had not returned to normal. C. V. B.

The relation of the diffusion constant to mountain sickness. GEORGE HARROP. *Proc. Soc. Exptl. Biol. Med.* **19**, 279–80(1922).—The diffusion const. for O_2 was detd. by the CO method of Krogh (*J. of Physiol.* **49**, 271(1915)). A series of detns. made at sea level agreed in the limits of error (5%) with those made at Arro de Pasco (14,300 ft.). The severity of the symptoms of mountain sickness was in inverse proportion to the value found for their diffusion const.; those having a value over 40 suffered little or not at all. C. V. B.

The absorption of cerebrospinal fluid into the venous system. L. H. WEED. *Am. J. Anat.* **31**, 191–221(1923).—Using microscopic methods, with India-ink, and prussian blue ppts., it is concluded that the pathway of absorption of the cerebrospinal fluid into the blood stream under normal conditions is by way of arachnoid villi into the great dural venal sinuses. Under the influence of an increased salt content of the blood, effected by the intravenous injection of strongly hypertonic solns., absorption takes place also by way of the perivascular channels and through the ependymal lining of the cerebral ventricles into the capillary bed of the nervous system. In the normal process filtration may be the phys. factor of great importance, but after the intravenous injection of strongly hypertonic solns. osmosis and diffusion apparently play the only active roles. A. T. CAMERON

Nature of sugar in blood. J. A. HEWITT. *Brit. Med. J.* **1923**, I, 590–1.—The evidence of Cooper and Walker and of Winter and Smith relating to γ-glucose in blood is considered as insufficient and their methods are criticised. H. considers that no evidence exists that γ-glucose is a component of normal blood, and theories of diabetes mellitus which demand the presence of γ-glucose in normal blood are without exptl. foundation. The formation of γ-glucose in carbohydrate metabolism may take place when and as required, and this active modification may only have a transitory existence. A. T. CAMERON

The pancreatic function during nursing. MARCO ALMAGIÀ. *Arch. farm. sper.* **35**, 1–4(1923).—Extirpation of the pancreas in dogs suckled by the mother, or fed on milk after weaning, results, not in glucosuria but in marked lactosuria, and in an altered metabolism of fats as shown by steatorrhea and extreme emaciation followed by death. The steatorrhea is greater than can be accounted for by the fat in the milk. The function of the pancreas in infancy is probably concerned with the metabolism of fat to a greater extent that in the case of adults. A. W. DOX

Exchange of iron in infants. A. LICHTENSTEIN. *Acta pædiatr.* **1**, 194–239(1921); *Physiol. Abstracts* **7**, 511.—A method is given for Fe estn. in milk and urine. Expts. on young children showed there is always more Fe excreted than is taken in, even with liberal administration of milk, the av. loss being about 0.25 mg. of Fe per day. It is suggested that a positive Fe balance might be obtained by administration of large quantities of medicinal iron. H. G.

Supposed biologic function of thiocyanic acid in animals. S. DEZANI. *Arch. fisiol.* **20**, 271–92(1922); *Physiol. Abstracts* **7**, 477; cf. *C. A.* **16**, 1799.—Free HCNS inhibits the peptic digestion of fibrin. Alk. thiocyanates act similarly because they neutralize part of the HCl and set free HCNS. This effect obtains only with concns. of the acid or its compds. stronger than 0.01% (*i. e.*, greater than physiol.). These results are against Cavazzani's supposition that the HCNS set free in the stomach from the thiocyanates of the blood and saliva may protect the gastric blood vessels from a possible corrosion. H. G.

Post-mortem acid formation and rigor mortis in heart muscle and their significance on the efficiency of the heart immediately before death. J. OBERZIMMER AND L. WACKER. *Arch. path. Anat.* (Virchow's) **236**, 224–42(1922); *Physiol. Abstracts* **7**, 485.—In the heart muscle the post-mortem formation of acid occurs earlier in cardiac than in skeletal muscle, and reaches its max. about 2 hrs. after death. In cachexial diseases very little acid is formed in the heart muscle, and then mostly in the left ventricle. The acid: alkali index is a measure of heart insufficiency. H. G.

Boric acid in the animal organism. G. MOSCATI. *Arch. sci. biol.* **3**, 279–88(1922); *Physiol. Abstracts* **7**, 393.—Traces of boric acid are constantly found in human urine and tissues, both of the adult and fetus. Part of the boric acid administered *per os* to animals is rapidly eliminated with urine; part accumulates in the tissues, which gradually get rid of it. H. G.

Importance of the liver on the synthesis of uric acid. Effect of the suppression

of hepatic function on the formation of uric acid, purine bases and urea. V. SCAFFIDI, *Arch. sci. biol.* **3**, 424–35(1922); *Physiol. Abstracts* **7**, 435.—The removal of the liver in fasting ducks causes a great diminution in the production of *uric acid*, but the diminution is not so great as stated by Minkowski. A smaller diminution occurs after ligature of the afferent blood vessels to the liver. The diminution is not attributed to suppressed hepatic function, but to the biological activity of the tissues. The diminution is greater in animals which die soon after the operation than in those which survive longer. The suppression of the hepatic circulation has no effect on the elimination of urea, which is against the supposed exclusive or prevailing role of the liver in the synthetic processes connected with nitrogenous catabolism. H. G.

Adsorption of pepsin by fibrin. A. MÜLLER. *Beitr. Physiol.* **2**, 1–4(1922); *Physiol. Abstracts* **7**, 402.—Fibrin cannot specifically accumulate and conc. pepsin from soln., but only picks it up to the extent to which it soaks in. H. G.

The physiological aspects of fasting. C. TIGERSTEDT *Finska läkaresallskapets handlingar* **63**, 33–4(1921); *Physiol. Abstracts* **7**, 366.—Measurements of the energy and N exchanges in a human subject over a fasting period of 24 days. H. G.

Chemistry of human aqueous humor. K. W. ASCHER. *Graefe's Arch. Ophth.* **107**, 247–97(1922); *Physiol. Abstracts* **7**, 487–8.—Estn. of the Cl content and refractometer value of normal aq. humor, that of the dead eye, and pathological aq. humor. In glaucoma the NaCl value (normal about 0.7%) is enormously raised. Variations in the protein content of the aq. humor are closely bound up with those in the Cl content. H. G.

Metabolism: Research at the seaside. L. HILL AND J. A. CAMPBELL. *Lancet* **1922**, I, 675–6; *Expt. Sta. Record* **47**, 665.—The resting metabolism was on an av. 34% above the basal metabolism measured in a closed calorimeter, and the figures obtained while bathing were 5, 6 and 7 times as high as the resting metabolim. The metabolism during paddling was higher than that during walking the same distance at the same speed, and that of walking heavily clothed was much higher than that of walking in a bathing suit. H. G.

Biochemistry of the blood in relation to calcium and phosphates. O. L. V. DE WESSELOW. *Med. Sci.* **6**, 470–82(1922); *Physiol. Abstracts* **7**, 423; cf. *C. A.* **16**, 4260.—A review with bibliography. H. G.

The mechanism of the action of the pancreatic juice on the secretion of enterokinase. V. V. SAVICH. *Russ. J. Physiol.* **3**, 54–9(1921); *Physiol. Abstracts* **7**, 432.—Pancreatic juice increased the formation of the enterokinase, but not by a nervous mechanism. The usual increase is present after atropine, and in animals with the solar plexus removed or the intestinal loop denervated. H. G.

The chemical composition of the gray and white matter of the human brain. B. I. SLOVTZOV AND A. M. GUEORGIEVSKAIA. *Russ. J. Physiol.* **4**, 34–51(1922); *Physiol. Abstracts* **7**, 415.—Fraenkel's method, although the best for the analysis of lipoids, does not give a total extn. The white substance is richer in lipoids; the grey substance contains more protein and extractives. The following were detd.: water, solids, ash, cholesterol, cephalin, lecithin, cerebrins, proteins. MeOH produces a marked alteration in the compn. of the brain of rabbits. H. G.

The action of distilled water studied from the point of view of osmotic pressure. M. I. VINOGRADOV. *Russ. J. Physiol.* **3**, 169–91(1921); *Physiol. Abstracts* **7**, 414.—The theory that the loss of irritability in nerves when placed in water is due to a loss of Na ions was put to the test. A portion of a frog's sciatic nerve was kept in water until it completely lost its irritability; then it was transferred into isotonic solns. of chlorides of Na, Cd, Ba, Ca, Sr, Mg, and Li. As the irritability of the nerve was found to be restored in all these solns., V. concludes that it is not the loss of Na ions but the change in the intra-osmotic balance of the nerve which is responsible for the loss in irritability. H. G.

Autolysis of the gray matter of the brain. A. M. GUEORGIEVSKAIA. *Russ. J. Physiol.* **4**, 53–62(1922); *Physiol. Abstracts* **7**, 415.—The gray matter was autolyzed at 37° for 4 weeks; samples were taken at the end of each week. There is a gradual decompn. of the proteins and lipoids. The fraction of insol. proteins and lipoids increases towards the end. There is also a considerable increase in amino N. H. G.

The effect of temperature on lipase from cold- and warm-blooded animals. M. L. PETROONKIN. *Russ. J. Physiol.* **4**, 63–91(1922); *Physiol. Abstracts* **7**, 403.—A comparative study of the effect of temp. upon the lipase of the frog and fish. Glycerol exts. of the pancreas were used. The main conclusion is that changes in temp. between 0° and 20° have more effect on the pig lipase. P. regards warm-blooded animals in general as the more sensitive to changes in temp. H. G.

The enzymes of bird blood. E. L. GLIVKA-CLERNOROOTZKAIA. *Russ. J. Physiol.* **4**, 135–49(1922); *Physiol. Abstracts* **7**, 424.—The main difference between mammalian and bird blood is a smaller amt. of catalase and a larger amt. of amylase in the latter. No difference was found in the amts. of lipase, protease, peroxidase, and antitrypsin. Different species of birds vary in amts. of enzymes in their blood. The concn. of the enzymes was studied in blood and serum. The serum has no catalase; the blood has a more powerful lipolytic action than the serum. The amylase and the antitrypsin are found to be the same in blood and serum. H. G.

Nitrogenous extractives of the spleen. S. DEMINOVSKII. *Russ. J. Physiol.* **4**, 193–216(1922); *Physiol. Abstracts* **7**, 401.—Carnosine, methylguanidine, and carnitine are absent. An unknown base with strong levorotatory properties was found among the extractives. H. G.

Refractometric and viscosimetric investigations on blood serum. F. ROHRER. *Schweiz. med. Wochschr.* **52**, 411–2(1922); *Physiol. Abstracts* **7**, 423. H. G.

Biochemical and biophysical relation between erythrocytes and albumin system in healthy blood at high altitudes. H. C. FRENKEL-TISSOT. *Schweiz. med. Wochschr.* **52**, 613–7, 635–41(1922); *Physiol. Abstracts* **7**, 493.—The increase of the red corpuscles at high altitudes depends on the constitution and the actual want of O_2. It does not always occur and not in all persons. The viscosity of the serum decreases with a long abode in high mountains; this is due to the decrease of protein. H. G.

Albumoses in blood. F. KLEWITZ. *Verhandl. deut. Ges. inn. Med.* **1921**, 416–21; *Physiol. Abstracts* **7**, 423.—Albumoses occur normally, both in human and animal blood, and are not characteristic of fever or other diseased conditions. H. G.

Potassium and physiological radioactivity. H. ZWAARDEMAKER. *Klin. Wochschr.* **1**, 535–7(1922).—A brief historical survey of balanced salt solns. from the time of Sidney Ringer. Z. believes that the importance of K in such solns. is associated with its radioactive properties. MILTON HANKE

Review of some recent literature on the endocrine glands. A. W. CROSBY. *Dental Cosmos* **65**, 280–6(1923).—Review with special reference to the relationship of the endocrines to Ca metabolism and to the teeth. JOSEPH S. HEPBURN

Variations in some of the urinary constituents and the alveolar carbon dioxide tension in relation to meals. E. C. DODDS. *Brit. J. Exptl. Pathol.* **4**, 13–9(1923); cf. *C. A.* **16**, 3099.—By examg. specimens of urine before and after meals, it was found that the first meal of the day was followed by a decrease in the excretion of acid and NH_3 calcd. per hr. This alk. tide lasted 1–2 hrs., and was followed by a period of increased excretion of acid and alkali per hr. This acid tide lasted for about 2 hrs., the period of the whole meal, effect taking roughly from 4 to 5 hrs. The changes following lunch were obscured in the majority of cases, by the acid tide of the breakfast. Diurnal origin of these variations was excluded by starvation expts. In view of these results, the alk. tide was associated with gastric secretion and the acid tide with pancreatic secretion. The p_H of the urine was found to rise after a meal, and to fall later. HARRIET F. HOLMES

The gastrin content of the human pyloric mucous membrane. S. E. AMMON AND R. K. S. LIM. *Brit. J. Exptl. Pathol.* **4**, 27–9(1923).—The human pyloric mucosa contains little or no gastrin, and certainly much less gastrin than is found in the lower animals. The only active ext. was prepd. from a stomach which showed signs of recent acute ulcers. HARRIET F. HOLMES

Demonstration, by a color test, of the proteolytic activity of pancreatic juice. L. V. HÉDON. *Compt. rend. soc. biol.* **88**, 171–3(1923).—The test is based upon the observation that during tryptic digestion of a protein in an alk. medium the reaction shifts towards the acid even without the preliminary treatment with CH_2O. To a few cc. of a 1% casein or 5% gelatin soln. in 2 tubes is added phenolphthalein and enough NaOH to impart to it a pink color. A drop of inactive or of activated (with enterokinase) pancreatic juice is now added and the tubes are incubated at 40°. The first tube serves as a control. The reaction is very rapid and manifests itself by the disappearance of the color. The test can also be made quant. by using phenolsulfonephathalein and adjusting the initial reaction to about $p_H = 8$. The developing acidity can then be measured from time to time by the change in p_H at definite intervals. S. M.

Mineral elements of the blood. A. DESGREZ AND J. MEUNIER. *Compt. rend.* **176**, 608–10(1923); cf. *C. A.* **14**, 3618.—The sol. salts of serum and of total blood were studied by making fractional crystns. of their solns. and examg. the fractions with the spectrograph. The spectra thus obtained were photographed with iodogelatin blue band plates which gave the ultra-violet band 404 and show the minutest traces of K, and also the D line. These plates are not sensitive to red rays and do not show the Li

lines. For the latter the Wratten panchromatic plates sensitive to red and infra-red were used; these show the 670 and 740 lines. From the appearance and relative brightness of these lines the proportions of Li, K, and Na are estd. The first fractions give less Li and K than the later fractions. The ratio of Li to Na appears to be about 1 to 500. Whole blood gives an Fe residue which retains a large portion of the Li. L. W. R.

Spontaneous variability of blood pressure and effects of diet upon high blood pressure with special reference to sodium chloride. H. O. MOSENTHAL AND J. J. SHORT. *Am. J. Med. Sci.* **165**, 531–50(1923).—Marked spontaneous variations in blood pressure occur in all individuals. Protein foods and NaCl are without effect upon the blood pressure; carbohydrates may indirectly increase it. The level of blood chlorides bears no relation to blood pressure. G. H. S.

Effect of the thyroid on creatine-creatinine metabolism. PAUL SCHENK. *Arch. exptl. Path. Pharm.* **95**, 45–63; *Münch. med. Wochschr.* **69**, 797; *Klin. Wochschr.* **1**, 1281(1922).—The creatinine of the blood of rabbits varies between 3.125 and 4.230 mg. per 100 cc. of whole blood. Thyroidectomy has no appreciable effect upon the blood creatinine. The elimination of preformed creatinine in rabbits varies between 45 and 54 mg. per kg. of body wt. in 24 hrs. After thyroidectomy the excretion falls. A marked increase in excretion takes place when thyroidectomized animals are fed thyroid ext. G. H. SMITH

Chemical composition of the aqueous humor of man and animals. ANDREAS RADOS. *Arch. Ophthalmol.* (v. Graefe's) **109**, 342–86(1922).—The nature of the soln. in the aq. humor of normal men and animals is almost the same; the addition of 90% alc. causes none, or at most but a trace of opalescence. Pathol. humors are colloidal solns. in which the dispersion varies in accordance with the degree of disturbance in the permeability of the cells. A colloidal aq. humor can be produced exptly. in animals by the simple removal of fluid from the eye, but in man the same effect is not observed. After puncture in man there is no transfer of protein to the humor such as can be detected by the refractometer or by pptn. with alc. There is no increase in salt or amino acid content of colloid fluids. In animals the partial removal of fluid from the eye causes an increase in protein; and the shorter the intervals between the two punctures the greater are the protein particles in the regenerating fluid. This disturbance in permeability caused by puncture is of short duration. The development of a colloid humor may be accompanied in both man and animals by a xanthochromia; bilirubin can be detected in the iris. Disturbances in the secretion of aq. humor are both quant. and qual. and are to be referred to elective filtration mechanisms in diff. animal species. G. H. SMITH

Water content of the blood. ELISABETH GRUNEWALD AND ERICH ROMINGER. *Z. Kinderheilk.* **33**, 65–84(1922).—With repeated detns. of the water content of the blood (morning and evening) over a long period of time certain fluctuations in value are to be detected for each individual. In general, at night there is a concn. of the blood, apparently referable to muscular work. In children from 2 yrs. of age upwards and in adults the type of curve becomes relatively fixed, but in infants it shows physiol. irregularities so that it is impossible to deduce pathol. conditions from the curve of water content alone. G. H. S.

Enzymes of the stomach of infants. EMIL MENGERT. *Z. Kinderheilk.* **33**, 85–95 (1922).—In the gastric juice of infants lab. enzyme predominates, as compared with adults where pepsin is in the greatest concn. insofar as activity is concerned. But with regard to abs. amts. the relation of lab to pepsin is exactly the same in infants as in adults. The functional difference between the gastric juice of infants and that of adults depends upon the difference in acidity of the gastric secretions. The same enzyme, which at the p_H of the gastric juice of infants acts as lab. functions as pepsin in the normal p_H of the juice in adults. Diminution in the amt. of pepsin always coincides with a like diminution in the amt. of lab. The two enzymes are most likely identical. G. H. S.

Cholesterol balance in infants, and its regulation. H. BEUMER. *Z. Kinderheilk.* **33**, 184–94(1922).—There is a regulatory mechanism for the cholesterol balance similar to that controlling N metabolism. Excessive ingestion of cholesterol but slightly increases, sub-normal ingestion never decreases, the balance. Disturbance in balance depends upon endogenous metabolic processes rather than upon the exogenous introduction of cholesterol. **Discussion.** BECK AND WACKER. *Ibid* 195–8. G. H. S.

Gastric function tests in healthy infants. FRITZ DEMUTH. *Z. Kinderheilk.* **33**, 276–97(1922).—Each infant shows a definite individual gastric motility and acidity and each food has a peculiar effect upon these properties. The retention of food parallels the casein content of the milk; human milk, half-milk, and malt soup are eliminated relatively quickly; whole milk, protein-milk, and butter milk more slowly. The re-

tarding influence of fats becomes more manifest in older children. With breast milk the retention is 4 hr. 25 min. (av.). The H-ion concn. constantly increases during the course of digestion, and it also increases with age, independently of other forces. There is no direct relation between food retention and the H-ion concn. after 2 hrs. The total acidity parallels the protein content and the duration of the retention. At a p_H below 4 the stomach contents are practically sterile; below 4.5 they are almost free of *B. coli*. Above this last level colon bacilli are to be found in 69% of cases, but this can hardly be considered a pathol. condition. G. H. S.

Blood sugar. A. STASIAK. *Z. physiol. Chem.* **123**, 104–15(1922).—Dog blood deproteinated with colloidal Fe in a good proportion of cases shows increased reduction after boiling with 2% HCl. If proteins are pptd. with $HgCl_2$ this increase after hydrolysis is not observed. The additional carbohydrate is not maltose. R. L. STEHLE

Extractive substances of muscles. XXI. The organic bases of pig muscle. I. A. SMORODINTZEV. *Z. physiol. Chem.* **123**, 116–29(1922); cf. *C. A.* **15**, 2646.—Analyses (not strictly quant.) gave the following: creatine 0.228%, purines 0.086%, carnosine 0.289%, methylguanidine 0.032%, carnitine 0.032%. The procedures employed are described in detail. R. L. STEHLE

Decomposition of carbohydrates in striated muscle. III. FRITZ LAQUER AND PAUL MEYER. *Z. physiol. Chem.* **124**, 211–26(1923); cf. *C. A.* **17**, 135.—The extents to which various carbohydrates give rise to lactic acid when treated with muscle were detd. Glycogen gave the highest %. Starch paste, dextrose, levulose and mannose were inferior and galactose and the disaccharides including maltose were inactive as were several polysaccharides also. Conclusion: Neither dextrose nor any known hexose is intermediate between glycogen and lactic acid in the metabolism of carbohydrate, but probably the phosphate of an as yet unknown hexose. R. L. STEHLE

The nitrogenous extractives of bull testicles. K. MORINAKA. *Z. physiol. Chem.* **124**, 259–66(1923).—Creatine, adenine, guanine(?), hypoxanthine(?), xanthine, arginine histidine, choline, and inositol were identified. R. L. STEHLE

Urochrome. "P. F." *J. pharm. chim.* **27**, 139–43(1923).—A summary of the work of Dombrowski and Browinski (cf. *C. A.* **2**, 147, 1298, 1725, etc.). S. WALDBOTT

Active principle of the pituitary gland. H. W. DUDLEY. *J. Pharmacol.* **21**, 103–22 (1923).—A cryst. picrate has been prepd. from the posterior lobe of the pituitary gland which has the characteristic actions of pituitary exts. on plain muscle and blood pressure. It had an activity of the same order as that of histamine. Investigation showed, however, that is was merely an inert picrate (K creatinine picrate) contaminated with small amts. of the pituitary principle. The mother liquor of this material gave a small EtOH-sol. residue, which was sepd. into AcMe sol. (*A*) and insol. fractions (*B*). *A* had an oxytocic activity equal to about 12 times that of histamine, producing a definite contraction of the uterus in a dilu. of 1 pt. in 1,250,000,000. *A* also contained a pressor principle. *B* had 0.05 the oxytocic activity of *A* and in doses of 0.5 mg. produced a strong depressor action followed by a moderate pressor action on the blood pressure. The oxytocic and pressor principles of *A* are 2 sep. chem. individuals and the pressor principles of *A* and *B* are most probably also 2 distinct chem. entities. Thus there is evidence for the presence of at least 3 different physiol. active principles in pituitary ext. C. J. WEST

ABDERHALDEN, EMIL.: **Lehrbuch der physiologischen Chemie mit Einschluss der physikalischen Chemie der Zellen und Gewebe und des Stoff- und Kraftwechsels des tierischen Organismus in Vorlesungen.** Berlin and Vienna: Urban and Schwarzenberg. 735 pp.

TAYLOR, W. W.: **Practical Chemical Physiology.** London: Edward Arnold & Co. 71 pp. 5s.

G—PATHOLOGY

H. GIDEON WELLS

A modified anaphylactic reaction induced by X-rays. R. G. HUSSEY. *Proc. Soc. Exptl. Biol. Med.* **19**, 22–4(1922).—Guinea pigs (250 g.) were inoculated with 0.01 cc. horse serum; 14 days later an intoxicating dose of 0.01 cc. caused typical anaphylactic reactions. Guinea pigs receiving daily 10 min. exposures to X-rays for 10 days following inoculation showed slight or no reaction to the intoxicating dose. This modifying effect is absent if 4 weeks intervene between the inoculations, and can only be produced by raying during the period of incubation. The X-rays had no modifying effect when applied to isolated tissue. C. V. B.

A simple quantitative precipitation reaction for syphilis. R. L. KAHN. *Proc. Soc. Exptl. Biol. Med.* **19,** 182–3(1921).—An *antigen* is prepd. by extg. dried heart muscle with ether, drying the heart and extg. with 5 cc. abs. alc. for each g. of material. Extn. is continued for 10 days in the ice box; the alc. is replaced and extn. continued for 1 month. Both filtrates may be used as antigens. Three parts of NaCl soln. are added to 1 part of antigen; no ppt. should form on standing at room temp. overnight. In testing 0.1 cc. of antigen is added to 0.3 cc. of clear inactivated serum and incubated in the water bath; the tubes are read after 1 hr. and 3 hrs. incubation. Marked pptn. at the end of 1 hr. is considered strongly positive; marked pptn. after 3 hrs. is positive. The test agreed with the Wassermann test in 98% of 1,119 expts. The test can also be applied as a micro procedure. C. V. B.

The abstinence from fat in acidosis. H. VAN WELY. *Nederland. Maandschr. Geneeskunde* **11,** 419–24(1923).—All patients exhibiting an increase of acidosis had a higher cholesterol content. By a fat-free diet the cholesterol content is decreased. R. BEUTNER

Investigations on experimental tar cancer. H. T. DEELMAN. *Nederlandsch. Tijdschr. Geneeskunde* **67,** I, 1416–24(1923).—The first cancerous cells originate at the end of a series of growth phenomena of the epithelium. It is impossible to state a transition from a benignant to a malignant type. A close contact of tar and cells is important. High-boiling carbohydrates are effective for the tar cancer. Some still higher-boiling substances are also effective; low-boiling substances are inactive. R. BEUTNER

Diastase in blood and urine in diabetes mellitus. G. A. HARRISON AND R. D. LAWRENCE. *Brit. Med. J.* **1923,** I, 317–9.—Simultaneous estns. on blood and urine of 55 diabetics and a large no. of controls show that presence of amylase is more or less accidental and of little or no value in diagnosis, prognosis or treatment of diabetes mellitus. A. T. CAMERON

Basal metabolism in mental disease. K. M. BOWMAN AND G. P. GRABFIELD. *Arch. Neurol. Psychiatry* **9,** 358–61(1923).—Of 50 cases only 4 showed rates above + 10% and only one (varying from + 77 to + 40%) above + 15%. The latter was manic-depressive. But 27 were below —10%. Among these were 8 of 9 with organic psychoses, while schizophrenics showed a tendency to low values, and manic-depressives a less tendency than any other group. Simple hypothyroidism does not appear to be the explanation of most of these low values, as tested by physical examn. and thyroid administration. A. T. CAMERON

Metabolism in eighty-four pregnant women. E. L. CORNELL. *Surgery, Gynecology, Obstetrics* **36,** 53–8(1923).—Increase in pregnant women is not const. The results in toxic cases are too variable for reliable conclusions. The death of the fetus cannot be predicted from the metabolic rate. A. T. CAMERON

Influence of intestinal bacteria upon the thyroid gland. D. J. HARRIES. *Brit. Med. J.* **1923,** I, 553–5.—Exophthalmic goiter is due to excessive absorption of tryptophan from the intestine. This is traceable to absence of indole-producers from the intestine, as indicated by absence of indican from the urine, and early disappearance of this indican is of serious prognostic importance in exophthalmic goiter. Diffuse parenchymatous goiter is characterized by excess of indican in urine, suggesting excessive destruction of tryptophan. A. T. CAMERON

Zinc in cancerous tissues. Contribution to the study of the physiopathology of zinc, and in particular of its significance in tumors. PAUL CRISTOL. *Bull. soc. chim. biol.* **5,** 23–40(1923); cf. *C. A.* **16,** 2551.—The presence of Zn in normal human tissues is confirmed, and the amts. (blood, 0.139; uterus, 0.170; spleen, 0.198; liver, 0.356; kidney, 0.316 parts per 1000, dry tissue) are comparable with those found by others. Study of a case of leucemia showed that in the blood Zn is located in the leucocytes. In benign conjunctival tumors Zn is slightly increased above normal; in epithelial tumors the increase is more marked (0.413 to 1.49). The Zn content depends on the nature of the tumor; fibrous tumors contg. less than epithelial tumors; the greater the amt. of connective tissue, the less the Zn; the amt. of Zn is parallel to the degree of karyokinesis; the more rapid the evolution of the tumor, the greater is the Zn content. A. T. CAMERON

Observations on tetany. S. G. ROSS. *Can. Med. Assoc. J.* **13,** 97–103(1923).—Study of 4 cases of adult tetany and especially of the concn. of some of the inorg. constituents of the blood shows Na moderately but definitely reduced (297 to 305 mg. per 100 cc.), Cl^- markedly reduced (2.03 to 3.93), bicarbonate markedly increased (65 to 130 vols. % CO_2), Ca essentially normal, inorg. P increased in 2 cases. Three of the cases were gastric tetany, the 4th, and a 5th showing no tetany were of $HgCl_2$ poisoning

with acute nephritis. The latter gave low Na, somewhat low chloride, normal bicarbonate and Ca, and high P. A. T. CAMERON

Unusual contents of ovarian cysts. Report of two cases. W. BOLT. *Can. Med. Assoc. J.* **13**, 250–2(1923).—One case showed an area resembling microscopically typical normal thyroid; the other contained in the wall of one side a typical triangular nodule resembling adrenal cortex with a streak resembling medulla. Chem. examn. of a small portion appeared to show a small amt. of adrenaline present. A. T. CAMERON

Phosphate content of the serum in cases of bone tuberculosis treated by heliotherapy. F. F. TISDALL AND R. I. HARRIS. *Can. Med. Assoc. J.* **13**, 177–8(1923).—Deposition of new bone occurring during cure of bone tuberculosis is not accompanied by an increase in inorg. P of blood serum. In many cases the P concn. was found actually less than in normal serum. No increase was found in 3 cases of soft tissue tuberculosis, 2 of whom were improved by treatment. A. T. CAMERON

The pseudo-globulin group. Relationship to agglutination, flocculation, and colloidal mastic reaction. C. H. H. HAROLD. *J. Roy. Army Med. Corps* **40**, 44–7(1923).—Agglutinins are contained chiefly in the pseudo-globulin group, and this is the dominant fraction in the Sigma test. Albumin fractions give low readings, and the euglobulin fraction gives a low or practically negative reading. Both pseudo- and euglobulins appear to be equally effective as precipitants in the colloidal mastic test, the actual quantity of globulin present being of importance. The reaction is apparently only indicative of the presence of globulins. A. T. CAMERON

Three cases of inborn errors of metabolism. D. PATERSON. *Proc. Roy. Soc. Med.* **16**, Sect. Dis. Children, 27–8(1923).—In 1 case of steatorrhoea, the feces contained 99% fat (only 8% split). Of 2 cases of congenital cystinuria, 4 and 2 yrs. old, of the same family, both continually excreted cystine, and from both bladder cystine calculi have been removed. A. T. CAMERON

The factors in uremia. W. L. BROWN. *Proc. Roy. Soc. Med.* **16**, Sect. Urology, 19–30(1923).—A review, followed by a discussion.

The composition and volume of pneumothorax cases. II. H. GRASS AND H. H. MEINERS. *Beitr. klin. Tuberk.* **51**, 134–45(1922).—The gas mixt. in pneumothorax alters with the development of an exudate. In dry pneumothorax the O_2 is about 3.67% and CO_2 about 6.95%. In cases with exudate the O_2 content diminishes and CO_2 increases; not rarely CO_2 can attain 10% and O_2 drop to 1%. An improved method is described for detg. pneumothorax vol. based on measuring the CO_2 content before and after introducing a known quantity of CO_2-free gas. Open pneumothorax is recognized by a high O_2 (3% or more) replacing the high CO_2 content; withdrawing gas causes a further increase in the O_2 content and lowering of CO_2. The vol. and limits of error as figured in 16 pneumothorax cases were on an av. 6.2% (ranging from 3.4 to 11.1%). H. J. CORPER

The intracutaneous reaction of the tuberculous to glycerol bouillon and tuberculin. F. H. HEISE AND LAWRASON BROWN. *Am. Rev. Tuberculosis* **6**, 1084–6(1923).—Glycerol bouillon (prepd. and evapd. in the same way as though tuberculin (O. T.) were being made) is not of itself likely to produce inflammatory reactions of 18 mm. diam. in the skin of healthy guinea pigs when given up to 0.1 cc. of a 100% soln. Glycerol bouillon at times (2 of 12 tuberculous guinea pigs gave a positive reaction to 0.1 cc. of 5 percent O. T.) does give a positive skin reaction when given at the same time as tuberculin in some tuberculous guinea pigs. In the adult human beings approx. 5% of 443 cases reacted to glycerol bouillon. About $^1/_5$ of these can be attributed to error. Thus 4% reacted to glycerol bouillon and tuberculin, weakening to this extent the value of the tuberculin skin test as a specific test. On the other hand, a hypersensitive patient may react to glycerol bouillon during a reaction produced by tuberculin. H. J. CORPER

Connective-tissue nutrients in the treatment of carcinoma. GUSTAV BLUNCK. *Chem.-Ztg.* **46**, 1016(1922).—By feeding animals with products from connective tissue, distinct increases in their resistance to mech. irritation and in the formation of scar tissue from wounds, were obtained with some of the products. By hydrolyzing connective tissue and cartilage from young animals, a nutrient was obtained which had a favorable effect on human connective tissue. It is a brown non-irritant, easily digested sirup, and is recommended in 5, 10 and 25 g. doses several times daily over long periods to increase the resistance of connective tissue and thus act as an accessory in cancer therapy. C. C. DAVIS

Carbon dioxide and viscosity of the blood. M. BERMEJILLO. *Arch. cardiol. hematol.* **2**, 54–9(1921); *Physiol. Abstracts* **7**, 234.—In diseases where the CO_2 content of the blood increases there is an accompanying increase in viscosity. The H-ion concn.

rises simultaneously, and B. suggests that the passage of substances across the corpuscle membrane and the swelling of the corpuscles contribute to the increase of viscosity. H. G.

The clinical value of basal metabolism determination. R. J. PICKARD. *J. Lab. Clin. Med.* **7**, 669–80(1922); *Physiol. Abstracts* **7**, 499. H. G.

Experimental rickets. E. MELLANBY. Med. Res. Council, *Special Rept. Ser.* (Gt. Brit.) No. **61**, 78 pp.(1921); *Expt. Sta. Record* **47**, 270.—A detailed report. H. G.

The reaction of the blood of infants with acute intestinal intoxication with the phosphotungstate reagent. J. L. KOHN. *Proc. Soc. Exptl. Biol. Med.* **19**, 323–4 (1922); *Physiol. Abstracts* **7**, 352.—An intense blue color was obtained by using the phosphotungstic reagent after the uric acid had been pptd. with Ag lactate. The reaction was not noted in normal controls. Its cause is unknown. H. G.

Importance of urinary bile acids for clinic and pathology. H. MÜLLER. *Schweiz. med. Wochschr.* **52**, 110–7(1922); *Physiol. Abstracts* **7**, 192.—The bile acids can be readily detected in the urine by Hay's test. They are absent in icterus hemolyticus, but are always present in icterus catarrhalis, liver cirrhosis, and cholelithiasis. The excretion of the bile acids is more const. than that of bile pigment in the urine. Certain poisons cause bile acids to appear in the urine (alc., atropine, gasoline, etc.). H. G.

Anaphylaxis and anaphylatoxins. H. H. DALE AND C. H. KELLAWAY. *Trans. Roy. Soc. London* **211B**, 273–315(1922); *Physiol. Abstracts* **7**, 271.—Two main theories are given to explain anaphylaxis: (1) the theory of cellular antibody, and (2) that of anaphylatoxin. New evidence is produced in favor of (1). A purified, concd. precipitin for crystd. egg albumin was prepd., and a control prepn. was made of similarly concd. globulin from normal rabbit serum. Guinea pigs were rendered passively anaphylactic to egg albumin by an injection two days previously of the precipitin. Intravenous injection of a further dose of the same precipitin, given a few min. before a dose of egg albumin, suppressed the anaphylactic reaction completely; normal rabbit globulin showed no trace of such protective action. Similarly, isolated plain muscle from anaphylactic guinea pigs suspended in salin soln. was completely protected from the stimulating effect of egg albumin by adding to the bath the precipitin which caused the anaphylactic condition; normal globulin had no protective action. The nature of so-called "anaphylatoxins," produced by digesting serum with carbohydrate sols, etc., has been examd. Evidence is produced that their toxicity is due, not to protein cleavage, but to formation of complexes which keep the foreign colloid finely dispersed in the finished product. The anaphylatoxins produce symptoms which are not identical with those of true anaphylactic shock, and they do not act on isolated plain muscle, as the anaphylactic antigen does, but only exhibit their action in the presence of the circulating blood. Their action is attributed to exposure of the blood to a large foreign surface. One dose of anaphylatoxin renders an animal insensitive to another, but leaves it, if anaphylactic, sensitive to the antigen. H. G.

Determination of fibrinogen content of blood in liver diseases. H. FULL. *Verhandl. deut. Ges. inn. Med.* **1921**, 478–80; *Physiol. Abstracts* **7**, 351.—The fibrinogen of the blood decreases in liver diseases, in proportion to the severity of the disease. H. G.

Studies in experimental tetany. I. The distribution of calcium in the plasma and cells. II. The variations in colloidal and ionic iron. E. W. H. CRUICKSHANK. *Biochem. J.* **17**, 13–29(1923).—The Ca content of 100 cc. of normal blood amounts (in mg.) to, total 9.12, plasma 8.11, cells 1.01; in tetany, total 5.7, plasma 5.26, cells 0.46. The loss of Ca amounts to 37.2% for whole blood, 54.4% for the cells and 35.2% for the plasma. Diffusible Ca in severe parathyroid tetany amounts to 94% of the total Ca, as compared to 60–70% in normal serum. From an immediate state of alkalosis, following parathyroidectomy, there develops an acidosis (as shown by a steadily falling p_H of the blood). "The immediate relief of the condition consequent upon the withdrawal of 70–100 cc. of blood is indicative of a toxic causative character. The Ca deficiency and the great loss of colloidal Ca are merely indicative of a rapid protein disintegration. BENJAMIN HARROW

Rickets: a review of its etiology with an explanation of its pathogenesis. ERIC PRITCHARD. *Arch. Pediatrics* **40**, 71–83(1923).—The "*causa vera* of rickets is an acidosis, predisposed to, remotely caused by, or contributed to by, a faulty diet or by a faulty environment, or by both." Cf. *C. A.* **17**, 1497. JOSEPH S. HEPBURN

Pathogenesis of celiac disease. REGINALD MILLER. *Arch. Pediatrics* **40**, 88–99 (1923).—Celiac disease is a digestive disorder affecting fat absorption. The most likely factor is some disturbance of the normal function of the bile salts. J. S. H.

Relation of focal infection to endocrine disturbance. B. R. TUCKER. *Dental Cosmos* **65**, 373–6(1923).—Review, with bibliography. JOSEPH S. HEPBURN

Thyroid instability. AUGUSTUS KORNDOERFER, JR. *Hahnemannian Monthly* **58**, 157–62(1923).—A discussion of thyroid instability, a dysfunction of the thyroid which is characterized by symptoms of both hypo- and hyper-activity. JOSEPH S. HEPBURN

The value of the refracto-viscosimetric properties of the blood serum in cancer. M. E. BIRCHER. *J. Lab. Clin. Med.* **7**, 660–4(1922).—The refracto-viscosimetric quotient of blood serum is practically const. under normal conditions. Samples of serum kept in the ice box 8 hrs. showed the same viscosity as those kept at room temp. The viscosity did not change if the serum was left with the blood clot 8 hrs. Serum obtained by centrifuging a sample of fresh blood showed the same viscosity as serum collected after the spontaneous retraction of the blood clot. Slight hemolysis did not alter viscosity. Benign tumors did not change the viscosity of serum, but in carcinoma the viscosimetric quotient was regularly low. E. R. LONG

The value of the refracto-viscosimetric properties of the blood serum in cases of tuberculosis. M. E. BIRCHER. *J. Lab. Clin. Med.* **7**, 733–5(1922).—The refracto-viscosimetric quotient of the blood serum indicates that in tuberculosis the viscosity of the serum is abnormally high in relation to refractivity. The total amt. of protein in the serum in tuberculosis is probably not high, but the protein appears to have a greater viscosimetric effect. The globulin is high, especially in progressive disease. A decreased quotient was also found in blastomycosis, bronchiectasis with abscess, recent catarrhal infection and lead poisoning. E. R. LONG

Studies in exhaustion. IV. Physical trauma. G. W. CRILE. *Arch. Surg.* **6**, 489–524(1923).—The effects of phys. injury were studied by observation of the blood pressure, measurements of the constituents of the blood, the p_H, alk. reserve, I content of the thyroid, adrenaline content of the adrenals, glycogen content of the liver, pituitrin activity, elec. cond. and temp. of the brain and liver, as well as clinical and histological observations. No changes were found except in the central nervous system, primarily the grain, where the elec. cond. and temp. changed somewhat variably. This indicates that shock is due to changes in the central nervous system.

JOHN T. MYERS

The etiology of urinary lithiasis: an experimental study. L. D. KEYSER. *Arch. Surg.* **6**, 525–53(1923).—Ca salts, oxalates, urates, and other normal cryst. deposits in urine are increased with great difficulty by feeding the corresponding salts. Feeding oxamide produced artificial concretions consistently. Oxamide is a foreign crystalloid in the urinary tract. On being excreted it finds no mechanism to keep its crystals separate. It is pptd. with colloidal material of urine in such a way that fusion of crystals occurs. Concretions are apparently of endogenous origin and due to defects in metabolism which cause changes in p_H, or colloidal content of the urine.

JOHN T. MYERS

Simple goiter as a result of iodine deficiency. J. F. MCCLENDON AND AGNES WILLIAMS. *J. Am. Med. Assoc.* **80**, 600–1(1923).—By correlating the prevalence of enlarged thyroids in the drafted men of the U. S. during the world war with the amt. of iodine in the surface waters of the country, an inverse ratio appears to exist. Three of the factors which influence the unequal distribution of iodine in water and soil are: (1) the igneous rocks which on weathering yield very small amts. of I to soil and water; (2) land which has emerged from the sea contains a comparatively large amt. of I; (3) atmospheric I from sea spray and from the burning of coal. L. W. RIGGS

Red and white corpuscles and catalase in the blood of complement-deficient guinea pigs. L. B. NICE, ALMA J. NEILL AND H. D. MOORE. *Proc. Okla. Acad. Sci., Univ. Okla. Bull.* **1922**, N. S. No. 247, 25.—Twenty-two guinea pigs from a strain developed at the Vermont Expt. Sta., and deficient in complement, were studied to det. the number of red and white corpuscles and the amt. of catalase in the blood. The blood of these animals averaged 18–34% fewer red cells per cu. mm. than did the blood of normal animals. This would decrease the amt. of available O in the tissues and may account for the lowered resistance of these animals to zero temp. The av. no. of white corpuscles were higher in the complement-deficient than in any lines of normal animals, indicating a protective device to make up for the lack of complement, as a defense against foreign invasion. No consistent relationship was found between the no. of white and red cells and the catalase content of the blood. In one-half of a group of normal animals the catalase content was low, in the other half more than twice as high suggesting that high and low catalase may be Mendelian characters.

L. W. RIGGS

Modern protein chemistry in the study of cataracts. A. JESS. *Arch. Ophthalmol.*

(v. Graefe's) **109**, 463–78(1922).—**The use of chem. methods for detg. the exact compn. of protein substances may be applied to the analysis of the lense in cases of cataract;** such studies may prove of some service in detg. the nature of the changes. Analyses of cataract lenses are given. G. H. SMITH

Domestic fowl as a source of immune hemolytic sera. R. R. HYDE. *Science* **55**, 541–2(1922).—The chicken fails to produce hemolysin in appreciable amts. to the erythrocytes of several species. Indeed, chicken serum tends to diminish the antigenic property of rabbit red cells. It is improbable that cytolytic sera can be produced in domestic fowls. G. H. SMITH

Relation of the reaction of the urine to static albuminuria in children. ERICH NASSAU. *Z. Kinderheilk.* **33**, 158–68(1922).—The administration of alkali almost regularly leads to the disappearance of the static albuminuria of children. This action is probably to be explained as a neutralization of the acids originating in the kidney. G. H. SMITH

The dissolution of gallstones. ÄNNE ROSIN. *Z. physiol. Chem.* **124**, 282–6(1923).—Gallstones, a cholesterol stone and a cholesterol-pigment-Ca stone, submitted to the successive action of solns. of Na desoxycholate, Na taurocholate, Na cholate and Na glycocholate, dissolved at the rate of 0.21 and 0.46%, resp., per 24 hours in the first solvent, and at very much slower rates in the other solvents. R. L. STEHLE

Cyanosis. CHRISTEN LUNDSGAARD AND D. D. VAN SLYKE. *Medicine* **2**, 1–76 (1923).—The cause of cyanosis is an abnormally large amt. of reduced hemoglobin in the capillary blood. The quant. effects of 4 factors contributing to this cause have been estd., *viz.*, (1) the total hemoglobin content, (2) the degree of O unsatn. of the arterial blood coming from aerated lung areas, (3) the proportion of blood passing from right heart to left through unaerated channels, and (4) the O consumption in the capillaries. There are various other factors which modify the coloration. Such are local skin vascularity, pigmentation, thickness of epidermis; and also the fact that the mean capillary content of reduced hemoglobin, $^1/_2$ $(A + V)$, only approx. represents the av. content. With changing conditions the latter may, instead of being midway between venous and arterial, approximate either more nearly than the other. The effect of these modifying factors is to cause the mean capillary concn. of reduced hemoglobin at which cyanosis becomes perceptible to vary from 4 to 6 g. of reduced hemoglobin per 100 cc. of blood, and perhaps sometimes even more widely, although it appears usually to lie near 5. H. G. WELLS

DICK, J. LAWSON: **Rickets.** A Study of Economic Conditions and Their Effects on the Health of the Nation. New York: E. B. Treat & Co. 488 pp. $5.50. Reviewed in *J. Am. Med. Assoc.* **80**, 950(1923).

H—PHARMACOLOGY

ALFRED N. RICHARDS

The later effects of gas poisoning. T. E. SANDALL. *Lancet* **1922**, II, 857–9.—The basis of this investigation is 83 record cards of pensioners whose disability has been officially recognized by the Ministry of Health as gas poisoning. The gases chiefly used in the war were Cl_2, $COCl_2$, H_2S, $(CN)_2$, CH_2ICO_2Et, $ClCOOCCl_3$, $(C_2H_4Cl)_2S$ and Ph_2AsCl. The immediate result of gas poisoning was, in general, with the Cl group an acute inflammatory condition of the lungs and air passages with pulmonary edema; with the phosgene group a slightly delayed action on the pulmonary tissues and a toxic action on the circulatory system; and with the mustard-gas group an immediate acute irritation of the skin, eyes, upper air passages and stomach, and a toxic action on the heart when very concd. The effects of the gases of the tear- and sneezing-gas group were mainly local. The late effects, 4–5 yrs. after the poisoning, are: emphysema, chronic bronchitis, or both, 46%; tachycardia, 45%; neurasthenia, 7%; pharyngitis 7%; conjunctivitis, 5%. Pulmonary tuberculosis was not found to be a common effect. Complaint was frequently made of digestive disturbances, but phys. examn. failed to give any evidence of actual gastritis or gastric catarrh. E. R. L.

Cardiac action of quinidine sulfate. A. CLERC AND P. N. DESCHAMPS. *Compt. rend. soc. biol.* **87**, 662–5(1922).—Observations were made on dog heart *in situ*. Quinine or quinidine was injected into a saphenous vein. When these drugs preceded an intravenous injection of nicotine there was no longer the primary effect of the nicotine, namely, the cardiac arrest and auricular fibrillation, though the tachycardia phase occurred as usual. Likewise, when ventricular extrasystoles and auricular fibrillation are produced by intravenous injection of the glucoside ouabain, quinidine stops these

early manifestations of the action of ouabain through vagus excitation on the cardiac rhythm but is incapable of stopping the fibrillation after prolonged action of the ouabain when both the vagus and the myocardium have been affected. A preliminary injection of quinidine prevents the appearance of these effects. Both quinine and quinidine very quickly render both the intra- and extra-cardiac vagus inexcitable, while they do not affect the extra cardiac sympathetic (stellate ganglion) and only in a very slight degree affect the intracardiac terminations. The 2 alkaloids are therefore pharmacodynamically the same but the quinidine is the more active. S. MORGULIS

Alcohol and white rats; a study of fertility. E. C. MACDOWELL. *Proc. Soc. Exptl. Biol. Med.* **19**, 69–71(1921).—Alc. caused a decrease in litter size which persisted for 2 generations, and was not further decreased by treatment of the second generation. The no. of litters of treated rats were greatly reduced; the untreated offspring, being genetically a selected lot, had higher litter-producing powers than the controls. C. V. B.

Alterations in the cardiac mechanism after administration of quinidine to patients with auricular fibrillation. R. L. LEVY. *Proc. Soc. Exptl. Biol. Med.* **19**, 88–91(1921); cf. *C. A.* **17**, 425.—Idiosyncrasy to the cinchona group was ruled out by a preliminary dose of 0.2 g. to 0.04 g. of quinidine. The treatment consisted of 0.4 g. in gelatin capsules by mouth 3 time daily, or every 2 hrs., until normal rhythm or untoward symptoms appeared. Not more than 2.0 g was given in 24 hrs.; the treatments did not exceed 10 days. In 3 patients normal rhythm was repeatedly established and lasted from a few hrs. to 23 days. The first effect was acceleration of ventricular rate with at times premature ventricular beats, then coarse fibrillation, impure flutter, flutter, and normal sinus rhythm. Digitalization is not essential for success in therapy. In 8 patients, normal rhythm was not established, although the preliminary changes were noted. Paroxysms of ventricular tachycardia occurred 3 times, showing that the drug must not be given with impunity. C. V. B.

Experiments with quinidine on conduction and on the refractory period in the dog heart. A. E. COHN AND R. L. LEVY. *Proc. Soc. Exptl. Biol. Med.* **19**, 174–9(1922).—Dogs under ether anesthesia and artificial respiration were used. By means of wicks sewed to the base and apex of the auricular appendix and leading to non-polarizable electrodes, which formed parts of 2 galvanometer circuits; and by means of appliances for sending break shocks to the auricles near the sulcus terminalis; it was possible to take simultaneous records of the excitation at the base and apex of the auricle and calc. the rate of conduction. The refractory period was ascertained by varying the time of break shocks; the longest of the periods after which a shock fails to elicit a response is the refractory period. Following the injection of quinidine the refractory period rose 0.0042, 0.0502, 0.0336 and 0.012 sec. in 4 expts.; and fell 0.0101 and 0.0084 sec. in 2 expts. The rate of conduction fell in 4 expts. The heart rate rose in the cases with increased refractory periods. C. V. B.

Experimental plumbism: therapeutic efficiency of some agents and comparative toxicity of other metals. P. J. HANZLIK, M. MCINTYRE AND E. PRESHO. *Proc. Soc. Exptl. Biol. Med.* **19**, 192–3(1922).—Metallic lead bullets were fed to 63 pigeons. The lethal dose was 0.16 g. per kg.; time of death 21 days, time of recovery in survival cases was 26 days, 8 mos.; lead in tissues of fatal cases 0.075%; max. loss of wt. in fatal cases was 40%, in survivals 8%; wt. loss began in 2–4 days and reached a max. in 20 days; a corresponding decrease in food intake was noted. Poisoning was moderated by NaI, $MgSO_4$, and CaS in the food; no benefit resulted from NaCl. The salts, $PbCl_2$, PbI_2, $Pb(C_2H_3O_2)_2$ and PbS, were not toxic when given in doses whose Pb content was 2 to 13 times that of the minimal fatal dose of metallic Pb. The metals Cd, Bi and Zn given in 2.5 times the fatal dose of Pb were toxic but not fatal during 27 days observation; similar doses of Cu, Sn and Fe were not toxic. C. V. B.

Hydrogen-ion concentration studies of solutions used for intravenous medication and clinical investigation. J. R. WILLIAMS AND MADELINE SWETT. *Proc. Soc. Exptl. Biol. Med.* **19**, 266–8(1922); cf. *C. A.* **16**, 2153.—Distd. water rapidly became acid from CO_2 absorption; when fresh p_H = 6.8, after 48 hrs. p_H = 5.23. Stock glucose solns. had a p_H of less than 5; boiling, autoclaving and storing for 24 hrs. all caused glucose solns. rapidly to become acid; buffering of these solns. with KH_2PO_4 and K_2HPO_4 to a p_H of 7.4 permitted their free use without unpleasant reactions. The normal salt solns. ranged from p_H 6.4 to p_H 4.95, the acidity being largely due to the distd. water. A Na citrate soln., used in a transfusion where a violent reaction followed, had a p_H of 10.25. Solns., of dyes for intravenous and intramuscular injection had a p_H of 5.0; when properly buffered 10–40% more of these dyes were excreted. Solns. of arsphenamine, tetanus antitoxin, and antipneumococcus serum were alk. Sera, vac-

cines and antitoxins of the N. Y. State Depart. of Health approximated the p_H of the blood. C. V. B.

Physiology and pharmacology of the heart of Anodonta. J. TEN CATE. *Arch. néerland. physiol.* **8,** 43–84(1923).—Atropine produces a paralysis of the inhibitory mechanism of the heart, and a cessation of the faradic excitation. Muscarine, pilocarpine and nicotine cause an excitation of the inhibitory mechanism of the heart and a decrease of the frequency and of the amplitude of the contractions. The action of muscarine is compensated by the one of atropine. Adrenaline and cocaine in small doses have no influence on the activity of the heart; in stronger doses they act in the same way as the toxic substances described before. Digitalin and $BaCl_2$ have a pronounced systolic action on the heart. Chloral hydrate at first suppresses the power of producing excitations, but the sensibility for excitations and the conductibility remain unchanged. All expts. prove the existence of an inhibitory app. in the heart; an accelerating nervous app. could not be traced, however. R. BEUTNER

The action of atropine on the dilator. F. G. ROCHAT. *Nederland. Tijdschr. Geneeskunde* **67,** I, 391–2(1923).—On an extirpated sector of the iris atropine(1:30.000) causes a contraction. R. BEUTNER

Movements of the esophagus and radioactivity. C. E. BENJAMINS. *Nederland. Tijdschr. Geneeskunde* **65,** II, 776–7(1921).—The expts. done by Zwaardemaker on the heart are repeated with the esophagus. It is shown, first, that K is necessary in the Ringer soln. to insure automatic movements, and further, that K can be replaced by U although the observations are somewhat uncertain. Also, free radiation can replace K, however, only if the *mesothorium prepn.* (being equal to 3.7 mg. Ra) is placed at a distance of $^1/_2$ mm. It is possible in this case, also, to state an antagonism between U and K. R. BEUTNER

Balancing and radioactivity. T. P. FEENSTRA. *Nederland. Tijdschr. Geneeskunde* **65,** II, 790–1(1921).—The effective radioactive element of the living organism, *e. g.*, K, can be substituted by other radioactive elements which need not be present as ions but may be present as colloid, or even as a gas (emanation.)—*According to the seasons* the hearts of frogs behave differently if they are perfused with a Ringer soln. contg. no K. Also the quantity of emanation necessary to induce the taking up again of the automatic movements of the heart varies in winter and in summer. R. BEUTNER.

Sensitization for radioactivity by hormones. H. ZWAARDEMAKER. *Nederland. Tijdschr. Geneeskunde* **65,** II, 794–6(1921).—Trying to find the conditions which cause the seasonal change in sensitiveness to radioactive substances acting on the heart, a number of substances were found which increase sensitiveness and others which decrease it. An increasing effect is produced by fluorescein, eosin and some hormones, *e. g.*, also choline and adrenaline which have an antagonistic action. A decreasing effect is due to Ca, Sr, Ba ions and thyreoiodine. The absence or presence of some such substances causes the different behavior of the heart of frogs in winter and in summer. R BEUTNER

Sensitization of potassium by nicotine. H. ZEEHUISEN. *Nederland. Tijdschr. Geneeskunde* **65,** II, 798–9(1921).—In the same manner as Zwaardemaker (see preceding abstract) the author investigates the sensitizing action of various alkaloids, and finds nicotine to be especially active. R. BEUTNER

The paradox of Zwaardemaker. LIBBRECHT. *Nederland. Tijdschr. Geneeskunde* **65,** II, 796–7(1921).—Fighting the theory of Zwaardemaker L. describes the following expts. If a frog heart is perfused with Ringer soln., contg. no KCl, it retards its movements. If normal Ringer soln., contg. KCl, is brought in contact with the heart it suddenly stops and after some time only begins to beat again normally. This is the same phenomenon as has been described by Zwaardemaker under the name of *paradoxon*, as being due to an antagonistic effect of U (α-particles) and K (β-particles). No such antagonism exists in the expt. described by L. R. BEUTNER

The action of digitalis on the mammalian heart. U. G. BIJLSMA, R. MAGNUS AND M. H. ROESSINGH. *Nederland Tijdschr. Geneeskunde* **66,** I, 2460(1922).—Expts. with the *isolated heart-lung system, prepd. according to Starling*, are undertaken to clear up the real nature of the action of digitalis on the heart. The action is due to a decrease of the vol. of the heart; therefore, in the presence of digitalis, the dangerous dilatation with which the automatic movement of the heart breaks down is reached at a higher resistance only. Cf. *C. A.* **17,** 2008. R. BEUTNER

Experimental anemia by injection of lecithin. R. BRINKMAN. *Nederland. Tijdschr. Geneeskunde* **66,** I, 2462–4(1922).—Little is known of the chem. nature of the hemolytic agents *in vivo*, but it seems that they have a lipoid character. Fats and cholesterol esters are less important than the phosphatides and cholesterol. These 2 substances

which have antagonistic chem. properties are always found to be present together in the organism. *The phosphatides cause hemolysis while cholesterol prevents it.* The hemolytic action of the lecithin in the organism *is not altogether compensated by the cholesterol which is present.* This is proved by the fact that, if the blood corpuscles are washed in isotonic salt soln., *their osmotic resistance increases.* The hemolytic agent can be traced in the washing fluid. A quant. analysis of the hemolyzing lipoid-layer of the blood corpuscles can be made as follows. The blood corpuscles are sucked up in filter paper, dried and extd. first by petroleum-ether (gasolene) and then by $CHCl_3$. The first ext. contains cholesterol; the second one ($CHCl_3$) contains the lecithin. The second ext., evapd. and suspended in physiol. salt soln., causes hemolysis, which may be prevented by adding some substance of the first ext.—As is well known, the ratio cholesterol : lecithin is const. *in vivo.* To change this ratio by expt. rabbits are fed with a diet free from cholesterol (no oats) and injected with lecithin. The animals rapidly show hemoglobinuria, hemoglobinemia, and all the characteristics of *"pernicious anemia."* By feeding oats the animal can be cured. R. BEUTNER

Modification of gastric function by means of drugs. T. I. BENNETT. *Brit. Med. J.* **1923,** I, 366–70.—Atropine decreases and pilocarpine slightly increases gastric secretion (measured by the acidity curves). Effects of alkali are greatly influenced by the time of administration. $NaHCO_3$ tends to excite the gastric mucosa to increased secretion; this effect more than counterbalances the neutralizing effect of the salt. Other salts, especially MgO, and $Bi_2O_3CO_3$, have far less stimulative effect. The rational method for their employment in cases of hyperacidity would be at such a period after meals as would allow neutralizing without stimulation. In gastric therapy $NaHCO_3$ finds its greatest usefulness in the rare cases in which there is an excess of mucous secretion with low or absent HCl. In cases of deficient acid secretion large doses of HCl often give striking effects, especially in cases of achylia with diarrhoea. No evidence was obtained of any effect of the bitters on gastric function. Atropine slightly delays, and pilocarpine slightly hastens gastric emptying. A. T. CAMERON

Ionic medication. D. CAMPBELL. *Brit. Med. J.* **1923,** I, 409–11.—Expts. with 2% KI for 30 to 40 min., with increasing current show amts. of I in the following 24 hrs. urine of from 30 to 146 mg. (25 to 200 milliamp.). With Na salicylate the amts. of salicyl bodies in the urine cannot be estd. with any accuracy. With a current rising to 170 milliamp. in 30 min. the total amt. excreted was 9 mg. The amt. of any drug introduced in the ionic state into the body by therapeutic currents is negligible; there is no local concn. and no evidence of deep penetration. A. T. CAMERON

Sodium morrhuate in the treatment of pulmonary tuberculosis. W. D. TEWKSBURY. *Am. Rev. Tuberculosis* **6,** 929–33(1922).—A 3% soln. of Na morrhuate contg. 0.5% phenol was used by injection on 18 cases of pulmonary tuberculosis. Nine were improved, 6 unimproved and 3 died. H. J. CORPER

The influence of modern chemistry on pharmacology. A. D. HIRSCHFELDER. *Ind. Eng. Chem.* **15,** 455–60(1923).—An address. E. J. C.

Influence of artificial oxidases on the course of septic lesions. RENATO ALAMANNI. *Arch. farm. sper.* **35,** 31–8, 49–56, 65–73(1923).—Intramuscular injections of colloidal MnO_2 were used successfully in the treatment of septic lesions. An increase in the no. of leucocytes in the blood was noted, also an increase in the intensity of the indophenol reaction for oxidases. The lesions healed rapidly. A. W. DOX

The cure of ozena with sucrose. C. ANGELOTTI. *Arch. farm. sper.* **35,** 57–64, 74–87(1923).—The treatment consisted of cleaning out the nasal cavity, then tamponing at first on alternate days then daily, with narrow strips of gauze satd. with a 50% soln. of sucrose. Good results are reported. A. W. DOX

Physiological decomposition of propionamide and fumaramide. H. SCHROEDER. *Beitr. Physiol.* **2,** 23–6(1922). **Behavior of salts of fumaric acid as sugar former.** W. BURGER. *Ibid* 19–22. **Question of formation of sugars by some unsaturated acids and acetaldehyde.** H. PIÜKEL. *Ibid* 13–18. **Behavior of lactic acid in phlorhizin diabetes.** R. PUFF. *Ibid* 7–10; *Physiol. Abstracts* **7,** 440–1.—Propionamide, the amide, and the NH_4 salt of fumaric acid, AcH, and lactic acid, when administered to phlorhizin-diabetic dogs, all cause an increased excretion of dextrose; aconitic and itaconic acids do not. In regard to lactic acid, Puff states that at least 2, and possibly all 3, of the C atoms appear as dextrose. In other substances there may be washing out of sugar, an effect on the protein breakdown to sugar, or—*e. g.*, AcH—a narcotic effect. H. G.

Action of radioactive substances on amylase. LABORDE AND LEMAY. *Compt. rend. soc. biol.* **85,** 497–8(1921); *Physiol. Abstracts* **7,** 380.—Solns. of radioactive substances, Ra, meso-Th, and Th bromides are without influence on the action of amylase. H. G.

Comparison of the action of quinine and of quinidine on experimental auricular fibrillation. F. C. ARRILLACA, J. GUGLIELMETTI AND C. WALDORP. *Compt. rend. soc. biol.* **86,** 407–8(1922); *Physiol. Abstracts* **7,** 108; cf. *C. A.* **17,** 424.—The power of quinidine to prevent the onset of fibrillation in the heart of a dog, when this is directly faradized at high rates, is much greater than that of quinine. When quinidine is injected intravenously in doses of 0.01 to 0.02 g. per kg. it is impossible to produce fibrillation no matter how great the rate of stimulation. H. G.

Action of sodium bromide on viscosity of the blood. J. SIMON. *Gazz. Osp.* **43,** 576(1922); *Physiol. Abstracts* **7,** 350.—NaBr markedly diminishes *in vivo* the viscosity of blood. H. G.

The control of X-ray therapy in hyperthyroidism by the basal metabolism test. H. M. JONES. *J. Radiology* **3,** 85–92(1922); *Endocrinology* **6,** 937–8. H. G.

Hyperthyroidism, basal metabolism and radiotherapy. H. W. VAN ALLEN. *J. Radiology* **3,** 83–5(1922); *Endocrinology* **6,** 952. H. G.

The action of the animal organism upon atropine. D. M. LAVROV. *Russ. J. Physiol.* **3,** 148–59(1921); *Physiol. Abstracts* **7,** 453.—Large doses of atropine sulfate were injected intravenously into rabbits, cats, and dogs. A few min. after the injection the blood, liver, and brain were analysed. The brain did not contain any atropine; the blood in rabbits contained about 1.5% (in cats 0.5) of the injected dose, and the liver about 2%. *In vitro* the atropine was found to be destroyed by the brain—about 2 mg. per g. of brain per hour, liver 0.1 in cat to 1.4 in rabbits, and by the blood 0.18 per cc. per hr. in absence of O to 0.74 in presence of O. H. G.

The action of quinine upon the peripheral blood vessels of mammals and man. S. V. ANICHKOV. *Russ. J. Physiol.* **3,** 206–19(1921); *Physiol. Abstracts* **7,** 454.—Quinine in concns. of 0.5 to 1 in 100,000 causes vasoconstriction. In concns. 10 times stronger it produces a vasodilatation at body temp., but at low temp. it generally causes vasoconstriction. H. G.

Analogy between methylene blue and oxidases. P. A. ASHMARIN. *Russ. J. Physiol.* **4,** 171–91(1922); *Physiol. Abstracts* **7,** 478.—Methylene blue accelerates the indophenol and the phenylendiamine reaction 10 to 20 times. There is a close analogy between the action of methylene blue and that of oxidases. H. G.

The relative parasitical value of arsphenamine and neoarsphenamine, with a description of the trypanocidal test. C. VOEGTLIN AND D. W. MILLER. *U. S. Pub. Health Repts.* **37,** 1627–41(1921); *Expt. Sta. Record* **47,** 882.—Rats infected with the dourine organism (*Trypanosoma equiperdum*) were employed. The results confirm those of an earlier work, namely, that arsphenamine of diff. manuf. is fairly uniform in parasiticidal power, whereas neoarsphenamine shows great variations. H. G.

Studies on the bio-assay of pituitary extracts. M. I. SMITH AND WM. T. MCCLOSKY. *Pub. Health Repts.* **38,** 493–512(1923).—A standard is proposed for use in assaying pituitary exts., prepd. from the infundibulum of fresh pituitary glands by treatment with acetone to remove water and fat. Comparisons of com. and exptl. pituitary exts. with an aq. soln. of this material are given as detd. by the oxytocic method verified by the pressor test. Seasonal variation was not detected nor is the activity materially affected by the source of the glands, as from steers or cows. Fractional sterilization of properly acidulated exts. does not affect activity, but the use of the autoclave at 15 lbs. pressure causes rapid deterioration. Com. exts. vary greatly in activity, one being 8 times as active as the weakest. A recommended standard of activity for the com. prepn. is the equiv. of 4 mg. of the standard powder or substance in each cc. H. C. HAMILTON

The toxicity of methanol. G. REIF. *Deut. med. Wochschr.* **49,** 183–4(1923).—Very severe intoxication with 10 fatalities resulted from the ingestion of a pure (American) methanol having the compn. CH_3OH 98.6, H_2O 1.4, aldehydes (calc. as HCHO) 0.0075, acidity (calcd. as HCOOH) 0.0080%, and esters (calcd. as MeOOCH) 0.0150%. Allyl alc., Me_2SO_4, HCN, alkaloids, EtOH and As were absent. There can be no doubt that the alc. itself was the cause of death. MILTON HANKE

The treatment (of goiter) by iodine under scientific control. MAX EDWIN BIRCHER. *Schweiz. med. Wochschr.* Aug. 31, 1922, p. 862; *Bull. mens. office internat. d'hyg., publ.* **15,** 127(1923); cf. *C. A.* **17,** 436.—The dangers of the use of iodine are avoided by the method used in America and based upon the knowledge of the function of the thyroid obtained by a study of the basal metabolism of the patient. JACK J. HINMAN, JR.

Salts of bismuth in the treatment of syphilis. ESCHER. *Ann. inst. Pasteur* **36,** 859–72(1922).—Favorable results were obtained with bismuth salts, especially Na and K tartrobismuthate in all stages of syphilis. E. R. LONG

Histological findings following subcutaneous injection of drugs. ADOLF HART-

WICH. *Arch. path. Anat.* (Virchow's) **240**, 249–60(1922).—Camphor injections caused tissue injury in 75% of 38 patients. The injury consisted usually of hemorrhagic inflammation, edema and vessel-wall necrosis. No important tissue changes were observed after injection of caffeine, morphine, Much serum, anti-diphtheric serum or "aolan." E. R. LONG

The therapeutic use of germanium dioxide in anemia. LUDWIG KAST, HILDA M. CROLL AND H. W. SCHMITZ. *J. Lab. Clin. Med.* **7**, 643–52(1922).—Germanium dioxide had a distinct erythropoietic action in several cases of secondary and of pernicious anemia. E. R. LONG

The pharmacology of isopropyl alcohol. D. H. GRANT. *J. Lab. Clin. Med.* **8**, 382–6(1923).—A synopsis of available data. The effect of isopropyl alc. on the skin is similar to that of EtOH. The toxicity is not less than nor more than twice that of EtOH. There is no objection to its use as a lotion or vehicle for medication which does not involve the probability of swallowing more than a few cc. Cf. *C. A.* **16**, 2944. E. R. LONG

The treatment of kala-azar by "stibenyl." A report of ten cases. L. E. NAPIER. *Lancet* **1923**, I, 280–3.—See *C. A.* **17**, 420. E. R. LONG

The theory of surface activity and the p_H theory in their application to the action of alkaloids. Answer to L. Michaelis and K. G. Dernby. I. TRAUBE. *Z. Immunitäts.* **35**, 539–44(1923); cf. *C. A.* **16**, 3128.—Polemic. E. R. LONG

The action of codeine on the digestion of meat in the dog. EDGAR ZUNZ AND ALEXIS DELCORDE. *Arch. intern. pharmacodynamie* **27**, 23–66(1922).—Under the influence of codeine-HCl meat remains in the stomach for a longer period of time than normally, but for not as long a period as under the influence of equiv. quantities of morphine-HCl or of the complete tincture of opium contg. or deprived of morphine. With codeine the first portions of the food reach the prepyloric part of the stomach and the duodenum as rapidly as normally. Codeine-HCl slows up the action of the gastric juice upon the meat, but not to as great an extent as morphine and the other constituents of opium. More acid albumin and less of proteoses, peptones and of the lower digestion products are found at the end of gastric digestion in the dogs which had received codeine than in the normal controls. In the fundus and in the prepyloric portion of the stomach as well as in the first part of the small intestine of the dogs receiving codeine more of the incoagulable N is in the form of NH_3 and less as NH_2-N than found in normal dogs; the differences, however, are not very great. W. A. PERLZWEIG

Alkyl arsenates in experimental trypanosomiasis. H. RITZ. *Arch. intern. pharmacodynamie* **27**, 67–80(1922).—Methyl arsenates are entirely without effect upon the the progress of trypanosome infection in small lab. animals. Allyl arsenate gave good results, comparable to those obtained with aresenious acid. The advantage of allyl arsenate over As_2O_3 is in its non-toxicity even on prolonged treatment. W. A. PERLZWEIG

Pharmacodynamic researches upon soporifics of the barbituric series. B. WIKI. *Arch. intern. pharmacodynamie* **27**, 117–61(1922).—The results of an extensive comparative study of the following 4 derivs. of barbituric acid are given in detail: the Na salts of veronal, luminal and of dial, and diethylammonium allylisopropylbarbiturate. The last named has the trade designation of "546." The toxicity, the anesthetic properties, the effects on the blood pressure and on respiration of rabbits were studied. The author concludes that of the 4 substances luminal is to be used with the greatest caution, and that dial and allylisopropylbarbituric acid are preferable in their mode of action to veronal. These 2 derivs. of barbituric acid were found to be almost identical in their action, advantages and disadvantages. It is very probable that in clinical practice the dosage of "546" will be found to be very close to that of the dial. W. A. P.

A pharmacological examination of benzaldehyde and mandelic acid. D. I. MACHT. *Arch. intern. pharmacodynamie* **27**, 163–74(1922).—PhCHO was found to possess the properties of relaxing the tonus and inhibiting contractions of smooth muscle; of acting as a definite local anesthetic; and of exercizing an antiseptic effect upon bacteria. Its toxicity for animals was found to be quite low. The Na and K salts of mandelic acid as well as the ethyl ester were also found to possess antispasmodic properties. W. A. PERLZWEIG

Eserine as a cardiac drug. L. CHEINISSE. *Presse med.* **31**, 39–40(1923).—Review. W. A. PERLZWEIG

Two new trypanosomocidal agents. L. CHEINISSE. *Presse med.* **31**, 81–2(1923).—A review of the work of Brown and Pearce (*C. A.* **13**, 2079) with the Na salt of *N*-phenylglycinamidearsonic acid, prepd. by Jacobs and Heidelberger (*C. A.* **13**, 2668, 2670, 2671),

and of Mayer's work with "Bayer 205" (*C. A.* **16**, 3128, 3129), in exptl. and clinical trypanosome infections. W. A. PERLZWEIG

Spinal anesthesia and intraspinal injection of caffeine. RENÉ BLOCH AND HERTZ. *Presse med.* **31**, 125(1923).—Spinal anesthesia in surgical practice was prevented and counteracted by means of intraspinal injections of caffeine. W. A. PERLZWEIG

Reflexes in spinal frogs as induced by chemical stimulation. J. O. FOLEY. *J. Comp. Neurol.* **35**, 15–22(1923).—The thresholds of chem. stimulation for acids used on frog skin were found to react in the following order of magnitude: H_2SO_4 0.01 *N;* HCl 0.01 *N;* AcOH 0.025 *N.* For alkalies the following order was found: KOH *N*/600; NaOH 0.01 *N;* Na_2CO_3 and K_2CO_3 0.1 *N.* The role of H and OH ions in chem. stimulation is discussed. W. A. PERLZWEIG

Progress of veratrine poisoning of the striated frog muscle. ARIE QUERIDO. *Proc. Acad. Sci. Amsterdam* **25**, 364–70(1923).—A preliminary communication the mechanism of veratrine action, which is to appear in detail in the *Arch. neerland physiol.* W. A. P.

Sodium sulfate treatment in dysentery. THEODOR HAUSMANN. *Wiener klin. Wochschr.* **36**, 89(1922).—Clinical notes. W. A. PERLZWEIG

Trepol and the kidneys. V. KOLLERT, U. STRASSER AND R. ROSNER. *Wiener klin. Wochschr.* **36**, 49–50(1923); cf. *C. A.* **17**, 593.—Trepol (Na and K bismutho-tartrate) is reported to produce in a number of treated cases of lues degenerative injury to the kidneys with profuse excretion of epithelial cells in the urine without accompanying albuminuria. In rabbits subjected to trepol intoxication kidney lesions were found corresponding to those found in Bi or Hg poisoning. Trepol produces moderate diuretic effects. W. A. PERLZWEIG

The salt question. MARTIN ENGLÄNDER. *Wiener klin. Wochschr.* **36**, 51(1923).—A demonstration of the catalytic effect of the presence of NaCl upon the reduction of alk. $KMnO_4$ soln. The expt. is held to illustrate the physiol. reactivity of NaCl especially in its diuretic and pyrogenic properties. W. A. PERLZWEIG

Acute barbital poisoning. WILLIAM COLE. *J. Am. Med. Assoc.* **80**, 373–4(1923).—Acute barbital poisoning, in the absence of a history, may be easily mistaken for a number of other diseases giving rise to a comatose state. In the fatal case here described the patient had taken more than 20 g. of barbital in a period of less than 4 weeks, 11.6 g. being taken during 4 or 5 days preceding treatment. This appears to be the first fatal case of barbital poisoning recorded in American literature. Control of the sale of the drug should be instituted as at present the laity can obtain it without a physician's prescription. L. W. RIGGS

Preservation of the life of completely parathyroidectomized dogs by means of the oral administration of calcium lactate. A. B. LUCKHARDT AND BENJAMIN GOLDBERG. *J. Am. Med. Assoc.* **80**, 79–80(1923); cf. *C. A.* **16**, 2897, 3698, 4279 and Dragstedt, *C. A.* **17**, 313.—The dogs were placed on a ration of meat and bread and each dog received by stomach tube 10 g. of Ca lactate dissolved or partly suspended in 200 to 300 cc. of water early in the morning. Several hrs. later 20 g. of Ca lactate was given mixed with the food, and late in the afternoon the animal again received 10 g. by the stomach tube. The amt. of Ca lactate given was varied from 0.43 to 2.7 g. per kg. of body wt. As a result of this procedure the dogs were kept alive without tetany. The min. amt. of Ca lactate necessary to prevent tetany in the early days of feeding was about 1.5 g. per kg. of body wt.; later this amt. could be reduced. After several months of administration of Ca lactate it can be stopped entirely without the appearance of tetany. Spoiled meat or overfeeding with unspoiled meat will bring on tetany, which can be rapidly controlled by the oral administration of Ca lactate and the giving of enemas. Tetany symptoms recur during the estral cycle. These are controlled by means of the oral administration of Ca lactate. Water in amts. of 1050 cc. to a 12 kg. dog does not prevent the appearance of violent tetany. If after parathyroidectomy the Ca lactate is withdrawn from the diet for a single day the most violent tetany will occur within 24 hrs. Bone ash has no appreciable effect in preventing the onset of severe tetany. It is possible that the administration of Ca lactate in massive doses, compared to those found in the U. S. P., may prove of benefit in cases of idiopathic epilepsy. L. W. RIGGS

Study of isoagglutinins before and after ether anesthesia. J. G. HUCK AND SARAH M. PEYTON. *J. Am. Med. Assoc.* **80**, 670–1(1923).—Tests with 25 patients led to the following conclusions: (1) There is no change in the blood groups after ether anesthesia. (2) No change of isoagglutinative phenomena was produced by shaking with ether for 1 hr., or 4 hrs. contact at 37°. (3) Transfusions can be performed safely within 24 hrs. after prolonged ether anesthesia, provided a suitable donor has been found previous to the beginning of anesthesia. (4) If severe reactions occur from transfu-

sions after ether anesthesia, they are apparently due to some other cause and not to a change in isoagglutinative phenomena. L. W. RIGGS

Physiologic effects of ethylene. A. B. LUCKHARDT AND J. B. CARTER. *J. Am. Med. Assoc.* **80**, 765–70(1923).—Ethylene, prepd. by slowly adding abs. alc. to H_3PO_4 at 210–230° and purified by passing through KOH soln., was mixed with varying proportions of O and was administered to various animals including dogs and 12 human subjects. Deep surgical anesthesia can be rapidly induced by C_2H_4 without any sense of asphyxia. Analgesia comes on early, apparently long before complete surgical anesthesia is established. With complete muscular flaccidity the pulse rate is slightly decreased; respirations are slow but regular; no cyanosis was ever observed. Recovery from the anesthesia is rapid on withdrawal of the gas mixt. Nausea was observed in some cases. The phenomena produced by the undiluted gas are partly asphyxial, but this factor can be removed by the addition of O, when it is seen that narcosis results from the C_2H_4 itself. L. W. RIGGS

Novocaine and curarization. H. LAUGIER AND R. LEGENDRE. *Proc. Nat. Acad. Sci.* **9**, 21–2(1923).—The conclusions of Fulton (cf. *C. A.* **15**, 3528) "are direct contradictions of the many physiological and morphological facts previously published by the authors." Novocaine as dil. as 1 in 10000 physiol. saline produces a rapid variation of the 2 characteristics of excitability: increasing the rheobase and lessening the chronaxie. Morphologically the myeline of the intact nerve fiber under the influence of novocaine becomes more bright, swells and produces on the inner face of the sheath protuberances which occupy a large section of the cylindraxis. Whenever a poison acts selectively on the nerve or muscle or even acts with a different speed on one and the other, a state of curarization is observed during the time of systemic intoxication. This is the action produced by novocaine as well as by a considerable number of poisons, or even by concd. NaCl. L. W. RIGGS

Poisonous substance in cottonseed. PAUL MENAUL. *Proc. Okla. Acad. Sci. Univ. Okla. Bull.* **1922**, N. S. No. 247, 68–70.—A cross section of a cottonseed kernel shows yellowish brown spots which are secretion cavities filled with a compd. called gossypol, a yellow colored substance having the properties of phenol and of tannic acid. It is insol. in H_2O but sol. in alkalies, the soln. by oxidation turning to violet then black. Gossypol may be extd. from cottonseed meal by ether and the extd. meal is not poisonous to rabbits, but the gossypol is fatal to rabbits sometimes in doses by the mouth as small as 0.1 g. and 0.05 g. injected into the blood caused death in 4 min. The symptoms were those of suffocation, the blood turning black in color. Expts. showed that with 1% of gossypol in sheep arterial blood previously satd. with O, only 45.6% of the O was given off that the same amt. of blood without the gossypol would liberate. Blood contg. 0.1% of gossypol gave off 64% of the O liberated by arterial blood. Gossypol in alk. soln., if shaken, makes a foam like saponins and like the latter causes hemolysis in even 0.1% solns. Toxicity of cottonseed products varies with the conditions of cooking the raw seed, raw kernels being most toxic and products subjected to high temps. least toxic. Expts. made by feeding one group of pigs com. cottonseed meal and another group similar meal, which had been moistened, autoclaved at 15 lbs. for 15 min. and dried, showed that those on the raw meal made 71% of the gain made by those fed autoclaved meal. All pigs fed com. cottonseed meal died after about 10 months but those fed autoclaved meal showed a normal growth after the exptl. period. L. W. RIGGS

Chemical bearings of pharmacology. HENRY G. BARBOUR. *Science* **57**, 335–41 (1923).—A new classification of drugs is proposed based on the state of present knowledge of their chemistry. The main divisions are: (1) substances from which no pure chem. principle has as yet been isolated such as pituitary, antitoxins, antivenoms; (2) substances which contain definitely isolated chem. principles but which are employed by preference in impure forms empirically found more effective, such as substances from digitalis, emodin, and resins; (3) definite chem. entities the details of the structure of which are incompletely known, examples being morphine, quinine strychnine, eserine and thyroxin; (4) substances of definitely known structural formula which include the simpler inorg. and org. compds., natural alkaloids and the synthetics. The possibilites of promoting substances of the first 3 groups to the 4th, and of improving the substances in the 4th group, offer unlimited work for the chemist in collaboration with the pharmacologist and therapeutist. Some of these possibilities are illustrated by a discussion of substances from each group. L. W. RIGGS

Effects of mercury inhalation upon the animal organism. A pathological study. JACOB GUTMAN. *Am. J. Syphilis* **7**, 1–42(1923).—Guinea pigs and rabbits were subjected to inhalations of mercurial vapors. The pathol. changes resulting from such

inhalations correspond closely with those following the administration of Hg orally, by injection, or by inunction. After inhalation the effects are to be observed in the intestine and kidney chiefly, with less outspoken lesions of the liver, spleen, adrenals, and nervous tissue. When concd. vapors are used pulmonary damage results. G. H. SMITH

The mercury inhalation therapy of syphilis. An historical review. JACOB GUTMAN. *Am. J. Syphilis* **7**, 145–52(1923). G. H. SMITH

Argyria and its relation to silver therapy. I. Argyria. Historical. II. Retention and elimination of silver with special reference to silver arsphenamine and silver therapy. C. N. MYERS. *Am. J. Syphilis* **7**, 125–44(1923).—The first part of the paper deals solely with the history of argyria and with clinical observations. The exptl. part is to appear later. G. H. SMITH

Reactions following arsenobenzene administration and their treatment. A. R. FRASER AND A. G. B. DUNCAM. *Am. J. Syphilis* **7**, 160–82(1923).—A statement of the clinical types of reaction, the pathol. lesions which may be produced, and the therapy of the disturbances which may follow the administration of arsenobenzene. G. H. SMITH

Toxic arsphenamine dermatitis. HEINRICH KROTT. *Arch. Dermatol. Syphilis* **141**, 9–31(1922).—The toxicity of the As in the prepns. used is the chief cause of the dermatitis. With Ag arsphenamine the danger of producing a dermatitis is somewhat greater. Tolerance for arsphenamine prepns. is very variable in individuals and by various means it can be artificially reduced. In the use of Ca to prevent exudation great care should be exercised. G. H. SMITH

Pharmacological action of neoarsphenamine. I. Action on surviving intestine. ALFRED PERUTZ AND MAX ROSENMANN. *Arch. Dermatol. Syphilis* **141**, 96–104(1922).—The surviving intestine of mammals is but little affected by relatively large amts. of neoarsphenamine; the intestine of cold-blooded animals is more sensitive. Arsphenamine when oxidized is not more active than when unoxidized. After protracted contact with arsphenamine a toxic manifestation, resembling those induced by the muscarine-choline group, appears. This effect cannot be referred to the As or to nitrite intoxication. G. H. SMITH

Icterus after arsphenamine therapy. H. WOSEGIEN. *Arch. Dermatol. Syphilis* **141**, 105–17(1922).—Icterus follows the administration of arsphenamine in about 3% of all cases treated. In one group it appears after a few days; in another group it may not appear until after a few weeks or even after 6 mos. The icterus persists for a few days, or in some cases, even as long as 3 mos. G. H. SMITH

Biologic actions of substances related to chrysarobin used in therapy of dermatoses. WALTER PATZSCHKE. *Arch. Dermatol. Syphilis* **141**, 123–51(1922).—Cignolin, anthrarobin, and the chrysarobins contain 3-methyldihydroxyanthranol as the active principle. The mechanism of their action in the treatment of dermatoses is obscure. When tested for their effect upon bacterial growth cignolin and chrysarobin showed no bacteriostatic action even in concns. up to 5%; anthrarobin, on the contrary, inhibited or prevented growth. Chrysarobin and cignolin are very efficient in the therapy of psoriasis but the mode of action cannot be through a delivery of O to the tissues, since anthranol and anthraquinone act in almost the same manner. They function neither as the bearers of O nor as peroxides. Anthraquinone, which does not affect the skin, liberates the greatest atm. of O; cignolin liberates the least; thus healing of dermatoses through a purely chem. action referable to O action is hardly possible. Theoretically, cignolin and anthrarobin use the same amt. of O in oxidation to anthraquinone. In alk. soln. anthrarobin is more quickly and completely oxidized than cignolin; but anthrarobin is ineffective in psoriasis. Cignolin and chrysarobin are protoplasmic poisons, acting upon the skin, conjunctiva, subcutaneous tissues and the gastrointestinal mucosa, but for this toxic action they require to be combined with the protein. Anthrarobin and anthraquinone do not unite with protein. The oxidation of cignolin and chrysarobin leads to clinical intoxication. Cignolin has a particular affinity for lecithin; a mixt. of the two substances in benzene is without effect upon the skin. When applied to the skin anthranol and anthrarobin are absorbed, and elimination begins on the 2nd day after the application, persisting for 2–4 days. For rabbits the toxic dose of cignolin is 0.1 g.; of chrysarobin, more than 1 g. Both substances act as nerve poisons. Since they pass through the kidney only when oxidized or almost oxidized they cause but little damage to kidney tissue. They do not cause the formation of methemoglobin either *in vivo* or *in vitro*. G. H. SMITH

Mercurial dermatoses; clinical, histological, experimental. JOHAN ALMKVIST. *Arch. Dermatol. Syphilis* **141**, 342–407(1922).—Vascular dilatation and edema follow

the paralysis of the sympatheticus by the toxic action of Hg. Atropine and adrenaline are ineffective in the treatment of Hg dermatosis, while digitalis, caffeine and camphor appear to be beneficial. G. H. SMITH

Therapeutic and toxic action of strophanthin on the frog heart. ERNST GEIGER AND ADOLF JARISCH. *Arch. exptl. Path. Pharmakol.* **94**, 52–73(1922).—Strophanthin was applied to the normal frog heart and to the heart impaired as a result of Ca deficiency. In the damaged heart the effect is purely therapeutic, the effect being to restore to normal the filling and pressure of the heart. Upon the normal heart the action must be considered as toxic. In low concns. the heart stops in diastole; in high concns. in systole; but in both instances there is a loss in the dynamic coeff. Neither the therapeutic nor toxic actions caused the heart to exhibit a pressure above normal. Impaired power in the heart may be restored to normal by digitalis, but it never becomes higher than that of the normal organ. G. H. SMITH

Action of medicinal substances and their combinations upon the intracranial vessels. JOHANNES KÜHN. *Arch. exptl. Path. Pharmakol.* **94**, 74–96(1922).—A variety of substances was tested for their effect in inducing vasoconstriction or dilatation of the intracranial vessels. The effects in diff. individuals varied, and indeed, in the same person quite diff. results were secured at diff. times. In general Na salicylate caused dilatation, as did antipyrine. Phenocoll caused constriction; caffeine caused dilatation. These substances in combination gave less clear-cut results. G. H. SMITH

Pharmacological action of simarouba bark. H. E. KROGMANN. *Arch. exptl. Path. Pharmakol.* **94**, 97–113(1922).—In a dose of 0.15 g. per 10 g. of frog simarouba bark is fatal. Intoxication is characterized by changes in reflex irritability and in an effect on the heart; small doses cause cessation in systole, large doses in diastole. Isolated skin musculature of the earthworm, and the intestinal muscle of both cold- and warm-blooded animals relax when treated with the substance. It causes vasoconstriction in frog perfusion expts., but does not alter the blood pressure when injected into rabbits. Certain clinical symptoms (intestinal catarrh, tenesmus, etc.) follow its administration. G. H. S.

Comparison of the action of tyramine and suprarenine upon the surviving intestine and uterus of various mammals. KARL HILZ. *Arch. exptl. Path. Pharmakol.* **94**, 129–48 (1922).—The surviving intestine and uterus of a large number of mammals were tested with tyramine and adrenaline. Upon the intestinal muscle of all species adrenaline had a uniform action—inhibitory, and previous treatment with tyramine did not modify this effect. The effects with tyramine varied with the species; guinea pig intestine was stimulated, rabbit and dog intestine was not effected uniformly, and cat intestine was inhibited. Tyramine always stimulated uterine prepns. of all species. Contrary to the findings of many observers, it is stated that adrenaline relaxes the pregnant guinea pig uterus. The pregnant or normal rabbit uterus is stimulated, although in the latter relaxation later occurs. The uterus of the cat is relaxed; the nonpregnant dog uterus is relaxed, while gravid uterine muscle is stimulated somewhat. These effects with adrenaline are not altered by preliminary treatment with tyramine. In its effects tyramine is much weaker than adrenaline. G. H. SMITH

Peristalsis in acute peritonitis. K. ARAI. *Arch. exptl. Path. Pharmakol.* **94**, 149–89 (1922).—The injection of cats intraperitoneally with 0.5 cc. of Lugol's I soln. per kg. of body wt. caused an acute sero-fibrinous peritonitis, of max. intensity within 48 to 72 hrs. after the injection and disappearing spontaneously after a week. The effect upon peristalsis was greatest within 24 to 48 hrs. after the injection. Oil of turpentine caused an hemorrhagic peritonitis, as did bacteria when administered in lethal amts. In bacterial and turpentine peritonitis peristalsis was retarded. Since the Lugol's soln. stimulates, rather than retards the isolated intestinal muscle, the effect upon peristalsis in I peritonitis cannot be considered as direct. Section of the splanchnic nerves did not stop peristalsis. Choline had a therapeutic effect upon peristalsis in bacterial peritonitis. G. H. SMITH

Dynamics of the mammalian heart under the influence of substances of the digitalis group. U. G. BIJLSMA AND M. J. ROESSINGH. *Arch. exptl. Path. Pharmakol.* **94**, 235–76 (1922).—Strophanthin caused the following changes in heart activity in the isolated heart-lung circulation prepn.; the min.-vol. is increased; arterial resistance is augmented; the slight dilatation of the heart is referable to changes in the right heart; filling of the heart is hastened, expelling is favored; the max. systolic ventricular pressure is usually increased; if the minimal diastolic pressure is high it becomes lower; the absolute power of the heart is increased, as evidenced by compression of the aorta; heart-block and alternans are abolished. The therapeutic action of strophanthin is dependent upon physiol. properties of the heart muscle which become altered by the drug. Cf. *C. A.* **17**, 2001. G. H. SMITH

Effect of hydrogen sulfide on frogs. OTTO GIRNDT. *Arch. exptl. Path. Pharmakol.* **94,** 277–313(1922).—Winter and summer frogs were injected with aq. solns. of H_2S, NaSH, and Na_2S, the results indicating that if the dosage of SH ions was constant the effects of the three compds. were similar. The injection of amts. of H_2S as small as 0.03–0.04 mg. calls forth such symptoms as cramp-like motions and a generally increased irritability. Larger amts., 0.047 to 0.055 mg., cause a peculiar tonic muscular cramp which persists for days or weeks. Still larger doses, 0.06–0.07 mg. or more, cause paralysis. G. H. SMITH

Pharmacological action of acids. R. BOEHM. *Arch. exptl. Path. Pharmakol.* **95,** 1–4 (1922).—During the effects of HCl in concns. of 3.3×10^{-3} to 1×10^{-2} the heart is not susceptible to the strongest elec. stimuli. Recovery from this condition is possible. G. H. SMITH

Share of carbon dioxide in the action of "cramp-center" poisons. HERMANN WIELAND AND RUDOLF L. MAYER. *Arch. exptl. Path. Pharmakol.* **95,** 5–16(1922).—Expts. on pigeons with picrotoxin, lobeline, and camphor show that to secure the convulsions due to these substances it is essential to reduce the CO_2 tension. As in the unintoxicated animal suffocation convulsions appear at higher CO_2 tensions, but as the intoxication increases smaller and smaller amts. of CO_2 are sufficient to produce the cramps. The point is finally reached where a reaction takes place in the physiol. CO_2 tension of the arterial blood. G. H. SMITH

Chlorine exchange between red blood cells and the surrounding fluid. II. Effect of narcotics. R. SIEBECK. *Arch. exptl. Path. Pharmakol.* **95,** 93–103(1922).—Narcotics, in concns. sufficient to suppress oxidation processes in the cells, inhibit the passage of Cl from red blood cells into the surrounding fluid. The substances tested (with human erythrocytes) included urethan, alcs., diethylurea and phenylurea. C. H. S.

Mode of action of narcotics after various methods of administration. HANS FRÜH. *Arch. exptl. Path. Pharmakol.* **95,** 129–44(1922).—The time of appearance of light and deep narcosis in frogs when immersed in aq. solns. contg. various narcotics in diff. concns. was detd. Urethan, paraldehyde, chloral hydrate, amylene hydrate, sulfonal, trional, ether, chloroform, neuronal, bromural, adaline, barbital, phenobarbital, and dial were tested. The concns. required (millimols. per l.) were compared with the mol. wt. and with the dispersion quotient (oil-water), no relationship being established. The anesthetic effect produced by intravenous injection of rabbits or by the introduction of the narcotic directly into the stomach showed that by the two methods the substances tested arranged themselves in practically the same sequence of potency. G. H. SMITH

Theory of narcosis. Distribution of inhaled narcotics in the body. E. LEUZE. *Arch. exptl. Path. Pharm.* **95,** 145–65(1922).—The narcotics $CHBr_3$, EtBr, PrBr, $C_2H_4Br_2$ become distributed after inhalation into the blood, brain and liver. The greatest amt. appears in the brain; the smallest percentage is found in the liver. For each narcotic the percentage distribution is peculiar, is const., and is independent of the concn. Within the blood the division of the narcotic between cells and plasma is also a const., independent of the concn. Distribution of a narcotic *in vivo* or *in vitro* between blood cells and plasma offers no indication of the ease with which the substance will penetrate the tissue cells. G. H. SMITH

Synergism of convulsant poisons. A. GÜRBER. *Arch. exptl. Path. Pharmakol.* **95,** 192–9(1922).—The typical action of strychnine and picrotoxin became intensified after the simultaneous administration of threshold doses to frogs. After only half the threshold doses both poisons yield strong strychnine or picrotoxin convulsions. A synergistic action is manifested. G. H. SMITH

Modification of guanidine intoxication by administration of acid. P. GYÖRGY AND H. VOLLMER. *Arch. exptl. Path. Pharmakol.* **95,** 200–5(1922).—Acid (HCl) favorably influences guanidine intoxication. An alkalosis is the essential feature of the intoxication. G. H. SMITH

Action of sulfur. H. WERDER. *Arch. exptl. Path. Pharmakol.* **95,** 238–40(1922).—Sulfides and polysulfides are readily resorbed and are more readily oxidized than is S in its elementary form. G. H. SMITH

Pharmacological position of Scilla glucosides among the digitalis substances. KWANICHIRO OKUSHIMA. *Arch. exptl. Path. Pharmakol.* **95,** 258–60(1922).—Squill is active upon the heart and, as measured upon frogs, belongs in the strophanthin group as regards intensity of action. Upon the mammalian heart (cat) the action is less than that of strophanthin. The local action is also much less than the glucosides from digitalis and strophanthin. G. H. SMITH

Methemoglobin formation by narcotics. PH. ELLINGER AND FRANZ ROST. *Arch.*

exptl. Path. Pharmakol. 95, 282–90(1922).—The dark appearance of arterial blood in ether or $CHCl_3$ narcosis is referable to methemoglobin formation, since under such conditions methemoglobin was revealed by spectroscopic examn. The hemoglobinuria and destruction of erythrocytes noted clinically after anesthesia are associated phenomena. G. H. SMITH

Experimental diuresis in the surving frog kidney. ROBERT SCHMIDT. *Arch. exptl. Path. Pharmakol.* 95, 267–81(1922).—The perfusion vol. was compared with the urine vol. eliminated. Hg (sublimate and novasurol) diuresis is characterized by an acceleration in excretion without an equal increase in the amt. of fluid passing through, indicating that there has been an effect upon the functioning elements of the kidney itself. With adrenaline the changes in the two vols. were in parallel. In caffeine diuresis both values are changed, there being no fundamental relationship between the changes in the two; suggesting that in caffeine diuresis vascular changes are not important. With urea no parallelism could be demonstrated. G. H. SMITH

Pharmacology of camphor. WILHELM STROSS. *Arch. exptl. Path. Pharmakol.* 95, 304–36(1922).—The activity of camphor is many times that of alcs. Combination with ether or urethan reveals the fact that camphor possesses a narcotizing component. The surviving smooth muscle of the intestine, gall bladder, urinary bladder, bronchi, and arteries is quicted by camphor; intestinal muscle is most susceptible to this effect. The point of action is the smooth muscle itself. The guinea pig and mouse uterus and the musculature of annelids show an increase in tonus after application of camphor. In its effect upon intestinal muscle, the action of camphor is simulated by camphor derivs. as well as by such compds. as anethole, eugenol, safrole, pinene, borneol, benzylborneol, oleum pini pumilionis, bornyval, and valyl. Camphor and its derivs. also paralyze the vagus endings. G. H. SMITH

Active alkaloids of ergot. H. H. DALE AND K. SPIRO. *Arch. exptl. Path. Pharmakol.* 95, 337–50(1922).—Ergotoxine and ergotamine are the same in all material respects, both as to quant. and qual. action. G. H. SMITH

Mechanism of chlorate action. R. L. MAYER. *Arch. exptl. Path. Pharmakol.* 95, 351–77(1922).—The reduction of chlorate in the human body follows the laws of chlorate-iron catalysis. Within the blood stream, as in the test-tube, the conditions (temp., hemoglobin, resorption velocity, concn. of chlorate) play a role, inhibiting or favoring the reaction. The reduction by the blood pigment is a catalytic action, hemoglobin being the catalyzer. G. H. SMITH

Action of heart glucosides on striated skeletal muscle. S. M. NEUSCHLOSZ. *Arch. ges. Physiol* (Pflüger's) 197, 235–56(1922).—At p_H 7.8 strophanthin is without noticeable action on fresh, non-fatigued muscle, but it materially increases the contraction of fatigued muscle. At 5.9 it causes a contraction in fatigued muscle, but at 8.4 it is without effect upon exhausted muscle. Digitalis, at 7.8, acts like strophanthin in acid solns., while in alk. media it behaves like strophanthin at 7.8. Small amts. of strophanthin increase the phosphoric acid elimination of fatigued muscle, while larger, contraction-producing doses decrease the elimination. The contraction of non-fatigued muscle in acid soln. is also accompanied by increased elimination of phosphoric acid. G. H. SMITH

Contraction of striated mammalian muscle after section of the motor nerves. E. FRANK, M. NOTHMANN AND H. HIRSCH-KAUFFMANN. *Arch. ges. Physiol.* (Pflüger's) 197, 270–87(1922).—The administration of acetylcholine to dogs or cats within 24 to 48 hrs. after section of the hypoglossus is without effect upon that portion of the tongue which is paralyzed insofar as contraction is concerned, although from the beginning dilation of the vessels of the tongue occurs. By the 4th day the intravenous injection of 2 mg. of acetylcholine begins to react upon the paralyzed tongue like weak stimulation of the lingualis, and from the 6th day it is possible to demonstrate the Vulpian-Heidenhain phenomenon. Much smaller doses (0.2–0.06 mg.) are sufficient when the lingualis is sectioned. Scopolamine inhibits the action of acetylcholine; with the lingualis sectioned the dose required for inhibition is much smaller than when the nerves are intact. Acetylcholine injected together with adrenaline does not cause relaxation of the tongue contraction. G. H. SMITH

Electrical behavior of muscle under the effect of acetylcholine. O. RIESSER AND W. STEINHAUSEN. *Arch. ges. Physiol.* (Pflüger's) 197, 288–99(1922).—During acetylcholine contraction of muscle the action current is not observed. G. H. SMITH

Influence of chemical contraction-producing substances upon fresh and narcotized frog stomach preparations. MASATAKA OHNO. *Arch. ges. Physiol.* (Pflüger's) 197, 362–67(1922).—Tetanic stimulation of short duration (5 secs.), even though of the same degree, gives different reaction curves with diff. prepns. Repeated stimulation

quickly leads to fatigue manifestations. All contraction-producing substances ($CHCl_3$, HCl, NaOH) used reacted upon tissue from *Rana temporaria* more strongly than upon *R. esculenta*. $CHCl_3$ produces persistent contractions of very uniform character, and prepns. rendered non-irritable by narcotics or other substances react as vigorously as those which are fully irritable. Many narcotics lead to secondary phenomena, as shown by incomplete reversibility. HCl is active in concns. of 0.002 *N*, but with the acid in a concn. of 0.01 *N* the contractions are higher, as is usually the case with 0.02 *N*. Stronger solns. (0.1 *N* — *N*) as a rule cause an elongation after an initial shortening. In this respect diff. prepns. vary. With the weaker concns. the contractions last much longer. NaOH always causes contraction which is of longer duration with the weaker soln. Like acids, higher concns. cause a relaxation after the contraction. NaOH, even in a *N* soln., causes a definite contraction, as does KCl in isotonic soln. $CHCl_3$ contractions are in part neutralized by both HCl and NaOH; and the contraction due to HCl is inhibited by NaOH, and conversely. Narcotized muscle still shows definite, but usually less marked, contraction to HCl and NaOH. G. H. SMITH

Surviving human appendix. KURT HOLM. *Arch. ges. Physiol.* (Pflüger's) **197**, 411–4(1922).—The surviving human appendix contracts spontaneously in oxygenated Ringer or Tyrode soln. The form of the motion resembles the contraction of mammalian intestine, that of the dog in particular. In amts. of 0.001 mg. added to 120–140 cc. of fluid, adrenaline causes a transitory inhibition of the motility. Atropine acts qual. and quant. as it does on animal prepns. Active motion of the appendix still occurs at temps. as high as 45°. As with mammalian intestine prepns. changes in tonus can be effected by altering the O supply of the fluid. The appendix reacts to Ba as does animal tissue. G. H. SMITH

Phlorhizin glucosuria. I. Hunger-phlorhizin experiments. P. JUNKERSDORF. *Arch. ges. Physiol.* (Pflüger's) **197**, 500–15(1923).—Dogs were deprived of food during 10 days and on the last 3 days were given phlorhizin. One group was killed 7 hrs. after the last treatment, the other after 24 hrs. In the first group the liver contained a very insignificant amt. of glycogen (av. 0.0567%) and the muscle also had but little (av. 0.198%). Comparison with other expts. indicates that the liver, in phlorhizin intoxication, loses its glycogen more readily than does the muscle. Fat infiltration of the liver was outspoken and the loss in water paralleled the increase in fat. Despite the considrable loss in body wt., the relative liver wt., because of the fat accumulation, was usually considerably increased (av. 3.4%). Sugar elimination in the urine is related to the amt. and mode of phlorhizin introduction, and more probably to the total fat content. Dogs killed 24 hrs. after the last introduction of phlorhizin showed the formation of considerable amts. of glycogen, formed out of body materials of a non-carbohydrate nature. The amt. of stored glycogen differed in diff. animals, as did the sugar excretion. The water content of the liver was usually normal when the fat content was normal; with a high fat content it was correspondingly low. The relative liver wts. showed only a slight difference as compared with dogs deprived of food but without phlorhizin treatment. G. H. SMITH

Action of some chlorine derivatives of methane, ethane, and ethylene upon the cornea. KURT STEINDORFF. *Arch. Ophthalmol.* (Graefe's) **109**, 252–64(1922).—The methane derivs., CH_3Cl, CH_2Cl_2, $CHCl_3$ and CCl_4, ethane derivs., $C_2H_4Cl_2$, $C_2H_2Cl_4$, C_2HCl_5, and C_2Cl_6, and the ethylene derivs., $C_2H_2Cl_2$, C_2HCl_3, and C_2Cl_4, all exert a more or less active paralyzing effect upon the nervous system. Because of secondary effects the only compd. suited to practical clinical use is $CHCl_3$. Upon the eye (dog) only two of the compds. produce noteworthy changes, and these effects are induced by instillation, by the subcutaneous injection of relatively large doses, or by their use as inhalation narcotics. Diff. animal species vary in susceptibility to these compds.,—dichloroethane and dichloroethylene. Aside from the effect on the eye, $C_2H_2Cl_2$ is actively hemolytic, has a narcotic action = 0.38 ($CHCl_3$ = 1), and causes ventricular stopping of the isolated frog heart. G. H. S.

Adrenaline hyperglucemia in infants, and the effect of calcium and other conditions. H. BEUMER AND F. SCHÄFER. *Z. Kinderheilk.* **33**, 34–47(1922).—The feeding of infants with small amts. of sugar causes an alimentary hyperglucemia. When very small amts. of glucose are introduced into the blood of infants with intestinal disturbance a considerably prolonged hyperglucemia results. The hyperglucemia induced in fasting infants by the subcutaneous injection of 0.3 to 0.5 mg. of adrenaline is rarely of such a value that measurable amts. of sugar are excreted in the urine. The quite diff. results reported by others are due to the fact that during the period of action of the adrenaline sugar was introduced with the food, thus producing an hyperglucemia and glucosuria. Adrenaline administration causes the same type of blood sugar curve after preliminary

feeding of glucose or levulose; the greater sugar excretion after levulose is referable to a greater permeability of the kidney for this sugar. Preliminary administration of $CaCl_2$ increases the adrenaline hyperglucemia, but has no const. effect upon the glucosuria. G. H. SMITH

The action of tyramine on pigeon beriberi. WERNER LIPSCHITZ. *Z. physiol. Chem.* **124,** 194–201(1923).—In 4 pigeons out of 9 there was an amelioration in the condition of beriberi pigeons after the intramuscular injection of tyramine. Rate of loss of wt. decreased and temp. increased somewhat. Tyramine showed no prophylactic value toward beriberi and its dimethyl deriv. (hordenine) was without any curative action. R. L. STEHLE

Saccharin feeding of rats. B. FANTUS AND L. HEKTOEN. *J. Am. Pharm. Assoc.* **12,** 318–23(1923).—Three groups of rats were used in the first series of tests. One was fed a ration of 10% saccharin, another 1% and the third was used as control. In 252 days Group I received about 310 g. of saccharin for each animal and Group II about 31 g. each. The animals in Group I did not consume as much food as those in Group II. However, the controls consumed no more than Group II. At necropsy no definite damage could be found in the kidney, liver, pancreas or stomach. In a second series of expts. 2 groups of rats were fed saccharin as before for their entire lives, the controls being kept until death. Some of the young of saccharin-fed animals were also fed the drug until death. Most of the animals died of lung affections. The results as a whole indicate that animals may be fed saccharin in relatively enormous amts. without producing lesions and that such feeding does not interfere with the development of the animals or of their progeny or shorten their lives. L. E. WARREN

The antidotal efficacy of ferri hydroxidum cum magnesii oxido, U.S.P. in arsenical poisoning. HUGH MCGUIGAN, H. V. ATKINSON AND G. A. BROUGH. *J. Am. Pharm. Assoc.* **12,** 327–32(1923).—Thirty-seven dogs and 53 rabbits were used and post mortems were carried out to eliminate possibility of faulty technic. Soln. of $KAsO_2$ and solid As_2O_3 were used as poisons. In dogs soln. of $KAsO_2$, = 0.029 g. of As_2O_3 per kg., and 0.19 g. of solid As_2O_3 were given. The expts. showed that the antidote has no influence on the course of poisoning by As in either animal and that it is of no value in treatment. A slight delay in time of death results after the ingestion of powd. As_2O_3; this is probably due to the colloidal nature of the antidote and its effect on soln. L. E. WARREN

Experimental studies on inflammation. II. Experimental chemical inflammation in vivo. ELIZABETH P. WOLF. *J. Exptl. Med.* **37,** 511–24(1923); cf. *C. A.* **16,** 291.—None of the salts tested produced a marked inflammation *in vivo* in concn. under 10%. K salts and the different citrates produced atypical inflammatory reactions in mice but not in frogs, but there was no true inflammation. Synergistic action occurs when equal parts of Sr and Mg salts are employed. NH_2 acids and amines as a class do not produce inflammation but histamine produces a marked inflammatory reaction in frogs and mice. Tyramine often killed frogs within an hr. after injection because of coagulation of the blood. Cantharidinium, histamine, and turpentine produced the most rapid and marked inflammation of any substances tried. These are all strongly positively chemotactic *in vitro*. The differences occurring when these substances are used in different species is a quant. rather than a qual. one, the body temp. being of some importance. Papain acted only in warm-blooded animals. Certain substances, such as scarlet R and croton oil in weak dilns., produced inflammation only some time after injection. Parazole produces an inflammation associated with necrosis of the tissues. All substances which produce marked and rapid inflammation on injection are positively chemotactic, but not all positively chemotactic substances produce inflammation. Soly. in oil also seems to be a necessary property. C. J. WEST

Experimental observations on the prophylaxis and treatment of syphilis. H. J. NICHOLS AND J. E. WALKER. *J. Exptl. Med.* **37,** 525–42(1923).—Calomel ointment proved efficacious up to 8 hrs. after inoculation with syphilis. No marked difference appeared between the action of calomel in a base of lanolin and vaseline and in a base of benzoinated lard and wax. Death from mercurial poisoning was produced in rabbits by a single application of a large amt. of calomel ointment. The method of gland transfer was used to test the sterilizing effect of arsphenamine and neoarsphenamine on old infections in the rabbit. The infection was completely abolished in every instance, whether by 1, 2, or 4 intravenous doses. C. J. WEST

Influence of sodium salicylate upon the arthritis of rabbits inoculated with non-hemolytic streptococci. H. F. SWIFT AND R. H. BOOTS. *J. Exptl. Med.* **37,** 553–84 (1923).—Rabbits inoculated intravenously with non-hemolytic streptococci, while under the influence of full therapeutic doses of Na salicylate, developed almost as many

inflamed joints as the untreated controls similarly inoculated. The salicylated rabbits, on the other hand, had a much higher proportion of mildly inflamed joints than did the controls. This anti-inflammatory action was most evident in the animals inoculated with streptococci of the lowest virulence, and could not be demonstrated in animals inoculated with hemolytic streptococci. C. J. WEST

Influence of calcium chloride upon experimental botulism. I. C. HALL AND N. C. DAVIS. *J. Exptl. Med.* **37,** 585–98(1923).—$CaCl_2$, given subcutaneously, intraperitoneally or intravenously, has no effect upon the production of botulism following the injection of *Bacillus botulinus* into the peritoneal cavity of guinea pigs. Treatment of the bacillus with EtOH markedly decreases its toxicity for guinea pigs. Toxin-free spores of the bacillus are pathogenic for guinea pigs. C. J. WEST

Importance of the adrenal glands in the action of pilocarpine, physostigmine and strychnine. C. W. EDMUNDS. *J. Pharmacol.* **20,** 405–18(1923).—The adrenal glands, if they are stimulated to increased activity by certain alkaloids, may influence very considerably the effects of those alkaloids. Thus, the motor effect of physostigmine upon both uterus and intestine is greatly modified at times by an increased output of epinephrine, an increase which reaches its height at from 20–30 min. after the alkaloid has been given. All the motor manifestations are removed in some cases. C. J. WEST

Chemotherapy of the acridine dyes in experimental tuberculosis. M. I. SMITH. *J. Pharmacol.* **20,** 419–34(1923).—Acriflavine, proflavine and their Ag compds., acridinium yellow and acridine orange possess a high degree of inhibition on the growth of the tubercle bacillus *in vitro*. They do not alter the pathogenicity of the tubercle bacillus when exposed to their action at 38° for 48 hrs. Serum treated with proflavine did not show inhibiting or bactericidal properties for the bacillus. No effect on the tuberculous process in guinea pig and rabbit was noted after application of proflavine, acriflavine and the Ag salt of the latter. C. J. WEST

Toxicity and actions of the *n*-butylamines. P. J. HANZLIK. *J. Pharmacol.* **20,** 435–49(1923).—The min. fatal dose per kg. by hypodermic injection in white rats is about as follows: less than 0.6 cc. for $BuNH_2$; 0.47 cc. for Bu_2NH and 0.45 cc. for Bu_3N. In rabbits the min. fatal dose of $BuNH_2$ hypodermically was 0.75 cc. per kg. and 0.95 cc. per kg. by stomach. Locally these 3 amines are non-irritating to human skin and only mildly irritating to mucosa. Systemically, effective doses of the 3 amines cause, in rats and rabbits, increased reflex excitability, convulsions, increased pulse and respiratory rates during the excitant stage, dyspnea, marked cyanosis followed by depression, slowing of the pulse and respiration, coma and death with large doses. Smooth muscle was markedly stimulated, but this was completely prevented and abolished in all organs by chelidonine. C. J. WEST

Pharmacological properties of some isourea derivatives. STEWARD BASTERFIELD. *J. Pharmacol.* **20,** 451–61(1923).—Benzoylisourea and 2-ethoxybarbituric acid, in large doses, cause some depressant effect when administered to mice. Larger animals were practically unaffected by moderate doses. *Carbethoxyethylisourea*, m. 39°, possesses depressant properties of about the same order as those of urethan. The rectal temp. falls rapidly in the 1st hr., the min. being reached in 1.5 to 2 hrs. after administration of the drug. Retovery is complete in 4–5 hrs. The drug also causes a peculiar muscular rigidity which develops rapidly after the drug is given. C. J. WEST

Comparative stimulant efficiency of some local and systemic agents on normal and depressed respiration and irritant efficiency of some agents. P. J. HANZLIK. *J. Pharmacol.* **20,** 463–79(1923).—With change in rate and amplitude and duration of action as the index of respiratory activity, the following agents arrange themselves in descending order of stimulant efficiency for the respiration of normal or untreated rabbits: H_2O at 2° to 20° and at 80°, 1% $AgNO_3$, 0.1% $HgCl_2$, $CHCl_3$, 1% HCHO, 20% camphor oil, tincture I, 1% tannin, turpentine, Et_2O, H_2O at 60°, 1% HCl, 1% PhOH, 5% NH_4OH, 10% collargol, 50% EtOH, H_2O at 40–50°, 95% EtOH, H_2O at 90°, H_2O at 30–38°, and 1% NaOH. The order of respiratory stimulant efficiency of the locally acting agents was different when the respiratory center was previously depressed by toxic doses of morphine. Strychnine and atropine were more efficient as systemic stimulants in morphinized than in normal rabbits. The results as to value as local irritants are the same as for respiratory activity and agree, in general, with those obtained by other methods of study *in vitro* and *in vivo*. C. J. WEST

Pharmacology of cadmium and zinc with particular reference to emesis. E. W. SCHWARTZE AND C. L. ALSBERG. *J. Pharmacol.* **21,** 1–22(1923); cf. *C. A.* **14,** 1157.—Zn, calcd. as metal, is about equally toxic on intravenous injection for all species studied; Cd is about 3 times more toxic to cats and dogs but to rabbits and rats 4–5

times more toxic than Zn. Subcutaneous injection is not a satisfactory method for studying the effect of these compds. because of the protein pptn. at the site of injection and poor absorption. On oral administration the lethal dose of Zn is 5–7 times greater than that of Cd. In dil. soln. Cd is more toxic than in concd. solns. Cd, calcd. as metal, is 8–9 times more effective as an emetic than Zn. In continued feeding expts. concns. of Cd of 250 or more parts per million in the diet were incompatible with life. This is also the mean emetic concn. No evidence of storage of Cd other than in the kidney, liver and spleen was obtained. The kidney usually contained the most metal relatively, while the spleen contained the least and sometimes none.

C. J. WEST

Carbon monoxide content of tobacco smoke and its absorption on inhalation. J. P. BAUMBERGER. *J. Pharmacol.* **21**, 23–34(1923).—The CO content of tobacco smoke can be detd. by oxidation to CO_2 by I_2O_5, the liberated I being titrated with $Na_2S_2O_3$. The amt. of CO produced in smoking is increased by strong suction. Cigarets yield an av. of 8.3 cc. CO per g. of tobacco smoked, *i. e.*, 0.97% CO by wt. In inhaling tobacco smoke about 61% of the CO is absorbed. Theoretically a max. satn. with CO of 22% of the hemoglobin of a smoker may occur. This degree of satn. cannot be withstood over an hour without disagreeable symptoms. It is extremely unlikely that the CO of tobacco smoke is injurious to any but the most inveterate inhalers.

C. J. WEST

Nicotine content of tobacco smoke. J. P. BAUMBERGER. *J. Pharmacol.* **21**, 35–46(1923).—The nicotine content of tobacco smoke can be detd. by Chapin's method, with modifications of Rasmussen (*C. A.* **10**, 1575), without C_6H_5N interference. The av. nicotine content of the smoke in % wt. of tobacco is 0.573% for cigarets. Of the nicotine in the tobacco about 14–33% appears in the smoke puffed. The max. amt. of nicotine retained in the body is calcd. as 36 mg. per hr. in inhaling and 27.5 mg. per hr. in puffing. This dose of nicotine would require a high tolerance on the part of the subject in order to escape disagreeable symptoms and would account for the illness of the novice as a result of smoking. It is undoubtedly true that in most cases a large % of this nicotine is expectorated before being absorbed, therefore the usual dose of nicotine may be very much less than the amt. calcd. above. C. J. WEST

Amount of smoke produced from tobacco and its absorption in smoking as determined by electrical precipitation. J. P. BAUMBERGER. *J. Pharmacol.* **21**, 47–57 (1923).—The elec. pptn. method can be used to det. the total amt. of suspended solid and liquid particles, including nicotine and C_5H_5N, in tobacco smoke. The smoke drawn into the mouth has a wt. of 9.59% of the tobacco burned. In puffing 66.7% of the smoke is retained in the body of the subject and in inhaling 88.2% is retained. Probably a large % of the smoke retained in the body is removed by expectoration before absorption of nicotine has been completed. C. J. WEST

Chronic intoxication by small quantities of cadmium chloride in the diet. C. O. JOHNS, A. J. FINKS AND C. L. ALSBERG. *J. Pharmacol.* **21**, 59–64(1923).—Very little or no growth occurred and death ensued in rats when the concn. of Cd was 1000, 500 or 250 p. p. m. When there were 125 p. p. m. of Cd in the diet, the initial rate of growth was normal. A concn. of 62.5 p. p. m. had no effect on growth. The food intake increased as the concn. of Cd in the diet was decreased. With a dosage of 0.56 mg. of Cd per day no cumulative action was observed. C. J. WEST

Action of furfural. HUGH MCGUIGAN. *J. Pharmacol.* **21**, 65–75(1923).—The PhOH coeff. of furfural (*A*), measured from its bactericidal action, is 0.26. A 2% soln. of *A* entirely inhibits the action of yeast on dextrose. A 1% soln. delays only this fermentation. Weaker solns. have no effect. *A* is about 0.5 as toxic for gold fish as PhOH and about $^1/_3$ as toxic as HCHO for the same animal. In large doses *A* has a paralytic action on frogs similar to that of chloral. Locally it is corrosive and anesthetic. In increasing doses *A* causes unsteady gait, inability to stand and finally paralysis in rabbits. The fatal dose by stomach is about 0.8 cc. per kg. body wt. The action on white mice is similar to that on rabbits. When in 5% soln., 0.6 cc. of actual *A* per kg. body wt. causes only a slight drowsiness in cats; 0.12 cc. of the pure drug per kg. causes increased irritability, increased respiration, salivation and finally strychnine-like convulsions. In dogs the action is much the same. C. J. WEST

Action of certain depressant drugs on the sensory threshold for faradic stimulation in human subjects and the effect of tobacco smoking on this action. W. HALE AND G. P. GRABFIELD. *J. Pharmacol.* **21**, 77–84(1923).—In non-smoking expts. the barbitals were found to have a slightly transitory effect in decreasing the irritability; antipyrine showed a max. effect within 0.5 hr. after ingestion in the manifestation of nearly 30% decrease in irritability; acetphenetidine showed a slightly greater max. effect than

antipyrine, more slowly attained and reached at the expiration of 1.5 hrs. after ingestion. In all 3 cases smoking tended to nullify the effect of these drugs, bringing the threshold observations within normal limits. C. J. WEST

Biological significance of lipoids. The action of cephalin and lecithin. W. STORM VAN LEEUWEN AND A. V. SZENT-GYÖRGYI. *J. Pharmacol.* **21,** 85–98(1923).—Cobra hemolysis can be increased not only by lecithin, but also by cephalin. The latter lipoid is less active in this respect than lecithin. It has been noted that the action of cobra venom on cephalin results in the formation of an acid the production of which could be followed by titration. After 24 hrs. at 37°, the cephalin-venom mixt. became sol. in EtOH and Me_2CO, indicating that the cephalin was decompd. by the action of the venom. C. J. WEST

Sensitivity of different nerve endings to atropine. V. E. HENDERSON. *J. Pharmacol.* **21,** 99–102(1923).—The endings of the bulbosacral autonomic outflow are rendered ineffective by atropine in the following order: cardiac vagus, chorda secretor, chorda vasodilator, intestinal vagus, bladder. The latter is not affected. The endings are depressed in the order: nasal, chorda secretory, cardiac vagus, tonus of pyloric sphincter and small intestine, bladder, oculomotor to pupil, salivary vasodilator, vagus to intestine for rhythmic and peristaltic movements. C. J. WEST

Comparative toxicity of inorganic lead compounds and metallic lead for pigeons. P. J. HANZLIK AND ELIZABETH PRESHO. *J. Pharmacol.* **21,** 123–9(1923).—$PbCl_2$, PbI_2, PbS, $PbCO_3$ and $Pb(OAc)_2$, administered in single and continuous or daily doses, whose Pb content was equiv. to or greater than the fatal dose of metallic Pb, were less toxic than metallic Pb for pigeons under similar conditions of experimentation. C. J. WEST

Therapeutic efficiency of various agents for chronic poisoning by metallic lead in pigeons. P. J. HANZLIK AND E. PRESHO. *J. Pharmacol.* **21,** 131–43(1923).—The daily administration of NaI in food and drinking H_2O, and of $MgSO_4$ and CaS in food, in doses corresponding to medium and large therapeutic doses, was found to be beneficial. The beneficial action of $MgSO_4$ is due in part to its cathartic action, but the mechanism of the action of NaI and CaS is not settled. The soly. of Pb in 0.2% HCl, and in 0.2% HCl and pigeon food *in vitro* at body temp. (conditions analogous to those in the gizzard) is markedly reduced by NaI, $MgSO_4$ and CaS. C. J. WEST

Comparative toxicity of metallic lead and other heavy metals for pigeons. P. J. HANZLIK AND E. PRESHO. *J. Pharmacol.* **21,** 145–50(1923).—Metallic Pb is more toxic and plumbism is more or less a sp. toxicity in the sense that characteristic symptoms occur rather promptly and mortality is higher with smaller doses than with other heavy metals. Al, Sb, Bi, Cd, Cu, Fe, Mn, Hg, Ni, Ag, Sn and Zn were only moderately toxic in amts. up to 4 times the fatal dose of Pb. C. J. WEST

Biological action of potassium and its radioactivity. H. ZWAARDEMAKER. *J. Pharmacol.* **21,** 151–9(1923).—This is a discussion and extension of the work of A. J. Clark (*C. A.* **15,** 2505). C. J. WEST

CLARK, A. J.: **Applied Pharmacology.** Philadelphia: P. Blakiston's Son & Co. 390 pp. $4.00.

I—ZOÖLOGY

R. A. GORTNER

Digestion in cold-blooded animals. A. J. SMIRNOV. *Kubanski Naučschno-Med. Westnik* **1,** 37–8(1921); *Physiol. Abstracts* **7,** 433.—The influence of the central nervous system on the gastric secretion of the frog was studied. There is a reflex secretion when food enters the mouth, but the bulk of the secretion is conditioned by the actual presence of food in the stomach, and cutting the vagi does not stop secretion. The juice contains HCl and a high concn. of pepsin, and in consequence of this only a small amt. is used up in digestion. As in higher animals, the acid regulates the passage of the food mass into the duodenum. H. G.

Chemistry of the cell structure of Noctiluca (**N. miliaris Suriray**); **morphology, physiology and cytology. II.** A. PRATJE. *Z. ges. Anat., I Abt., Z. Anat. Entwicklungsgesch.* **62,** 171–232(1921); *Physiol. Abstracts* **7,** 404.—The soly. of both parts of the nucleus (nuclear substance and nucleoli) in various reagents and their behavior with methyl-green acetic and acetic-carmine agree with the properties of the corresponding parts in higher plants, flagellates, and metazoa. It is probable that the nucleoli consist partly of globulin, the nuclear material largely of nucleoprotein. The effects of various reagents are described, and to some extent interpreted in terms of colloid chemistry. H. G.

Biochemical facts concerning preparations of the central nervous system of Bufo. E. SERENI. *Arch. fisiol.* **19**, 163–82(1921); *Physiol. Abstracts* **6**, 560–1(1922).—The cerebrospinal prepn. of *Bufo vulgaris* usually survives for approx. 20 hrs. at a temp of 15° to 20° by using O obtained from H_2O_2; approx. 3 cc. of 0.9% soln. of H_2O_2 are required. The fluid contains CO_2, and amino acids; approx. twice the quantity of these compds. is present in the fluid from living prepns. as in that from dead prepns. The reaction of the fluid is strongly alk. after boiling; amino acids are still present. Strychnine exerts a beneficial influence on the survival of the prepn. if used at the beginning of the expt., and prolongs the life of the prepn. without the production of tetanic symptoms if used in the last hrs. of the expt. Death of the prepn. is attributed to accumulation of amino acids within the nerve cells. JOSEPH S. HEPBURN

Production of heat in Rana in different experimental conditions. T. GAYDA. *Arch. sci. biol.* **2**, 318–55(1921); *Physiol. Abstracts* **7**, 44–5(1922).—The heat production is const. in the fasting frog provided the temp. and the oxygenation of the water be const., it is greater in recently captured frogs, and varies greatly with the individual. At 13°, the heat production, in cal. per g. per hr., ranges between 0.236 and 0.795 for males and between 0.196 and 0.562 for females; it increases with the temp. of the water, but decreases at 37°. Summer and winter frogs yield the same results. When frogs are perfused with Tyrode soln., which is isotonic with their blood serum, the heat production, erythrocyte count, and O_2 content of the blood decrease, even when meat is fed or glucose is substituted for the major portion of the NaCl in the perfusion soln. A single injection of either curare or nicotine decreases heat production, the curare causing disappearance of muscular tonus, the nicotine producing paralysis of the central nervous system and motor nerve endings. A single injection of atropine increases heat production by virtue of cerebral excitation and decreased tropic action of the vagus. JOSEPH S. HEPBURN.

12—FOODS

W. D. BIGELOW AND A. E. STEVENSON

Destruction of organic matter in the Kjeldahl method with vanadium salts. WALTER PARRI. *Giorn. farm. chim.* **71**, 253–9(1923).—In the *Kjeldahl digestion of flour* the time required to obtain a clear soln. is considerably less when a mixt. of V_2O_5 and CuO is used than when either of these catalysts is used alone. With a 1-g. sample of flour, 20 cc. of H_2SO_4, 0.1 g. of V_2O_5 and 0.5 g. of CuO the time required is 2.2 hrs.; with 0.1 g. V_2O_5 or 0.5 g. CuO alone the time is 6 hrs. A. W. DOX

Report of committee C on recommendations of referees. R. E. DOOLITTLE. *J. Assoc. Official Agr. Chem.* **6**, 272–80(1923).—The action of the association at the 1922 meeting on the methods of analysis studied by its referees is reported. The report includes changes in the *methods for As, H_2O and ash in wheat flour* and the adopted methods for *H_2O in dried fruits* and in *dried apples* only, *crude fiber in prepared mustard, temp. of dissolution in AcOH and acetone-CCl_4 tests on cacao butter* and *H_2O ext. in tea.* H. A. LEPPER

The examination of milk. GRONOVER. *Z. Nahr. Genussm.* **45**, 18–24(1923).—The compns. of several samples of watered milk are shown. The value of the f. p. detn. is emphasized (cf. *C. A.* **12**, 835), although certain unusual watered samples are shown where this detn. does not indicate adulteration. D. B. DILL

Control of the fat content of market milk. A. BEHRE. *Z. Nahr. Genussm.* **44**, 321–33(1922).—Milk analyses made during 1920–2 offered no proof of a change in fat content due to post-war feeding conditions. D. B. DILL

Morphological phenomena in organic liquids. Application to the detection of watering of milk. LÉON SEPTELICI. *Bull. soc. hyg. aliment.* **10**, 632–8(1922).—Morphological aspects being but the visible expression of the physico-chem. condition of liquids, changes in the latter will cause changes in the former. If to a large drop of natural skim milk (boiled or unboiled) is added a small drop of any fresh therapeutic serum (human or animal) to which has been added 4% of a good grade of India ink, there is caused a whole series of characteristic changes in the aspect of the drop of milk, which are described in detail. These are not produced if the milk has been watered, or if it is whole. S. explains how this can be made the basis of a method of detecting watering of milk. A. PAPINEAU-COUTURE

Surface tension of milk. HANS BEHRENDT. *Z. Kinderheilk.* **33**, 209–17(1922).—Fat has no essential influence upon the surface tension of cow milk. Milk with a re-

duced protein content has a considerably higher surface tension than whole milk. The stalagmometric consts. of milk are dependent upon the content of the milk in protein and dissolved org. substances, particularly fatty acids. C. H. S.

"Electropure" process of treating milk. F. W. ROBISON. *Ind. Eng. Chem.* **15,** 514–8(1923).—Detailed studies were undertaken to det. the effect of the "Electropure" process (described with illus.) of treating milk on microörganisms and on other factors. The treatment at 155° F. and above completely destroys *B. tuberculosis* and reduces the bacterial count over 99%. In electro-treated milk the cream line is well preserved, the taste is pleasant and natural and superior to that of steam-pasteurized and the keeping quality is excellent, better than of the most perfectly pasteurized and decidedly better than of com. steam pasteurized milk. H. A. LEPPER

The action of metals on milk. M. DONAUER. *Butter, Cheese, and Egg J.* **13,** No. 18, 12, 14, 16, 18(1922); *Expt. Sta. Record* **47,** 281–2.—The results are reported as the no. of mg. of the various metals absorbed by sweet and sour milk and a 0.2% soln. of lactic acid per sq. cm. of surface exposed for one day at pasteurizing temp. and at storage temp. For sweet milk at pasteurizing temp. the amts. of some of the metals absorbed were approx. as follows: bronze 0.04, Cu 0.08, Sn 0.1, Al 0.2, Fe 0.8, and Zn 1.6 mg. The amts. of these metals absorbed at normal storage temp. were found to be about $^1/_{10}$ those at pasteurizing temp. Studies of the amt. of the metallic lactates required to give a distinct taste in water showed considerable variation, as follows: Al 1:110,000, Cu 1:240,000, Sn 1:25,000, and Fe 1:70,000. Since metallic lactates are readily absorbed by the fat, the flavor of butter may frequently be affected by absorbed metals. A discussion is also presented of the possibilities that absorbed metals hasten decompn. and putrefaction in milk products. H. G.

A study of milk during foot-and-mouth disease. A. CHOLLET. *Lait* **1,** 273–80 (1921); *Expt. Sta. Record* **47,** 282.—Milk of cows suffering from the disease was analyzed. During the height of the disease the amt. of milk was decreased and the compn. was changed. The percentage of fat and ash seemed to increase with a decrease in the percentage of lactose. H. G.

Reading the fat column in the Babcock test for milk. C. F. HOYT. *J. Assoc. Official Agr. Chem.* **6,** 354–62(1923).—A comparison of the Babcock with the Roese-Gottlieb run on Mojonnier app., Adams paper coil and asbestos gravimetric methods, details of which are given, for fat in milk was made to obtain information on the effect of reading the column from the bottom of the lower to the top of the upper meniscus. Such readings give higher results by the Babcock than by any of the other methods. The results obtained by reading to the line of sepn. between the fat column and the overlying glymol agree more closely. This way of reading would be advantageous because of the distinctness of the line and ease of reading and it conforms with the well established practice of reading cream samples. If these results are verified by others the present method should be modified. H. A. LEPPER

The degree of acidity of milk. I. M. KOLTHOFF. *Handel. Genootsch. Melkk.* **120,** Pt. 2, 5–16(1920); *Expt. Sta. Record* **47,** 582.—The results of 24 tests on the acidity of milk made with methylene blue and phenolphthalein, using different amts. in the tests and different dilutions of the milk, showed a marked but gradual decrease in the amts. of NaOH required to produce the neutral point with the use of more indicator or a greater dilution of the milk. H. G.

Partial neutralization of acidity of cream before pasteurization as a factor in butter making. W. H. SPROULE AND M. GRIMES. *Ontario Dept. Agr. Circ.* **38,** 12; *N. Y. Prod. Rev. Am. Creamery* **53,** No. 9, 417–22(1921); No. 10, 465–9(1922); *Expt. Sta. Record* **47,** 79–80.—Averages of 50 expts. on the effect of the acidity of cream on the loss of fat in the buttermilk showed that with 0.35% or less of acidity there was 0.133% of fat in the buttermilk, with 0.35 to 0.4% of acidity 0.2% of fat, with 0.45 to 0.5% of acidity 0.335% of fat, and with over 0.5% of acidity 0.522% of fat. In a comparison of 11 different samples of cream, one part of each sample being partially neutralized and the other not neutralized, it was found that the av. percentage of fat in the buttermilk from unneutralized cream was 0.72% and from neutralized cream 0.45%. The score and quality of the butter from the unneutralized cream, especially after storage, was not quite so good as that from the partially neutralized cream. H. G.

The significance of yeasts and oidia in pasteurized butter. F. W. BOUSKA AND J. C. BROWN. *Wis. Univ. Studies Sci.* No. **2,** 131–8(1921); *Expt. Sta. Record* **47,** 784–5.—A discussion is given of the influence of *Oidium lactis* and yeast on the spoilage of butter in storage. It was shown at a no. of creameries that by properly pasteurizing the cream, using a noncontaminated starter and thorough steam sterilization of the equipment, yeasts and molds were practically absent or present in very small amts.

in the butter, and that the keeping qualities of the butter were materially increased. H. G.

The effect of babassu feeding on butter and lard. N. BENGTSSON. *Z. Nahr. Genussm.* **44,** 336–9(1922).—The feeding of babassu cake (pressed from the seeds of *Orbignya lydia*) to cows increased the Polenske value of the butter fat to 3.0–3.3 with a R.-M. value of 28.8. The consts. of lard from babassu-fed hogs were not abnormal. D. B. DILL

The determination of the butter fat in fat mixtures. F. H. VAN DER LAAN. *Rec. trav. chim.* **41,** 724–39(1922).—The content of sol. volatile fatty acids as detd. by the Reichert-Wolney method is proportional to the butter fat content for mixts. of butter fat with beef fat and with peanut oil. The R.-W. values lie on a straight line and are independent of the other kind of fat used. The results of Arnold (*Z. Nahr. Genussm.* **14,** 157(1907)) on mixts. of butter and pork fat show the same result. Above a 50% butter fat content the Polenske no. (insol. volatile fatty acid no.) changes proportionally to the butter fat content. Below 50% butter fat content the increase in the P. no. is somewhat slower than proportional to the butter fat content. With mixts. of a neutral fat (*i. e.*, nearly free from volatile acids) and cacao fat the R.-W. no. is not proportional to the cacao fat content. The R.-W. curve was concave toward the *X* axis when the R.-W. no. was plotted on the *Y* axis and the % of the cacao fat on the *X* axis. This type of curve was obtained with cacao fat from 13 factories. The P. no. curve was slightly concave in the other direction but practically straight for mixts. with more than 40% cacao fat. The form of these curves is due to the fact that cacao fat contains no butyric acid while the sol. fatty acids present are capronic and caprylic acids. Palm-kernel oil gives curves for R.-W. and P. nos. resembling those for cacao fat. From the graphs given the compn. of mixts. can be detd. If the R.-W. no. deviates considerably butter fat is present. This can be detd. with a max. error of 2% in fats contg. 5 to 20% butter fat by the combined use of the R.-W. no., the P. no. and the new Kirschner no., in a manner that cannot be briefly abstracted. The new Kirschner no. is detd. thus: The neutralized liquids in which the R.-W. no. and P. nos. were detd. are placed in a 200-cc. volumetric flask, which is filled to the mark with H_2O. 100 cc. are used to det. the av. mol. wt. of the fatty acids present. To the remainder a no. of cc. 0.1 *N* $AgNO_3$ is added equal to 1.1 times $^1/_2$ the sum of the titer obtained in the detn. of the R.-W. and P. nos. The Ag salt ppt. is filtered off and the $AgNO_3$ remaining in the 50 cc. of the filtrate is detd. by Mohrs method. From the data the titer of the fatty acids that remained in soln. is calcd. as the new Kirschner no. The mean mol. wt. is detd. by evapg. the solns. of the Na salts to dryness and const. wt. at 100°. After subtracting the wt. of phenolphthalein used the mean mol. wt. can be calcd. from the wt. of the residue and the amt. of 0.1 *N* NaOH used in the titration. E. J. WITZEMANN

The homogeneity of margarine. A. GRONOVER AND FR. BOLM. *Z. Nahr. Genussm.* **44,** 340–4(1922).—Margarines freshly manufactured are usually homogeneous. Wrapped pound cubes may show 1–1$^1/_2$% less moisture in the outer layer than in the center of the cube. This is believed to be due to evapn. D. B. DILL

The water content of margarine. A. BOMER. *Z. Nahr. Genussm.* **45,** 45–51 (1923).—A discussion of the adulteration of margarine by the addn. of water. D. B. DILL

Holland cheese and the standard fat content of cheese. A. J. SWAVING. *Z. Nahr. Genussm.* **45,** 6–17(1923).—Production and exportation statistics for Holland's dairy products are given. The av. fat content of whole milk cheese produced in Holland is shown for the years 1907–21. The legal standards for cheese of Holland, Denmark, Norway, Sweden and Switzerland are summarized. D. B. DILL

The ratio of casein to fat as a factor influencing the quality of Swiss cheese. K. J. MATHESON. *Butter, Cheese, and Egg J.* **13,** No. 7, 32–6(1922); *Expt. Sta. Record* **47,** 283.—M. reports the results of studies and observations on the cause of the occurrence of glass cheese in the manuf. of Swiss cheese. It is usually found more prevalent during the summer months, and observations and expts. indicate that it is caused by a change in the ratio of the casein to fat. More glass cheese occurred where the fat content of the milk was above 4% and where there was less than 0.75 lb. of casein to 1 lb. of fat. H. G.

Oxygen and perforations in canned fruits. E. F. KOHMAN. *Ind. Eng. Chem.* **15,** 527–8(1923).—Apples were canned under 3 sets of conditions to bring about a variation in the O content. In plain cans O disappears in a few days, whereas in enameled cans it disappears only slowly; this indicates that action on the tin plate rather than combination with apples causes the disappearance. This is offered as a tentative explanation

for the fact that enameled cans perforate more rapidly than plain cans. In causing perforations O obeys the law of mass action rather than acting catalytically.
H. A. LEPPER

The estimation of lactose. VINCENT EDWARDS. *Chem. News* **126,** 191(1923).—The end point in the volumetric estn. of lactose in milk products with Fehling soln. is improved by adding enough Mg tartrate to cover a knife end before the reduction and a small piece of paraffin before the titration. H. A. LEPPER

The judgment of filled chocolate products, especially those containing alcohol. H. SCHELLBACH. *Z. Nahr. Genussm.* **45,** 25–32(1923).—The legal standards for chocolate products and the types found in German markets are discussed. D. B. DILL

The examination and judgment of milk chocolate. F. HÄRTEL AND F. JAEGER. *Z. Nahr. Genussm.* **44,** 291–317(1922).—The amt. of milk solids is estd. from the content of milk fat, casein and lactose. The fat is extd. with low-boiling petroleum ether in a Knorr, or similar, app. The Reichert-Meissl value of the extd. fat is detd. The milk fat content = (Reichert-Meissl value × fat)/30. Milk fat × 4 = whole milk solids. *Casein* is detd. as follows: Heat to boiling 10 g. of the fat-free dry substance with 200 cc. 0.25% $Na_2C_2O_4$ soln. and keep for 15 min. on a boiling water bath. After 12 hrs. make up to 250 cc. with the $Na_2C_2O_4$ soln., add a small quantity of kieselguhr, shake and filter. To 100 cc. of the filtrate add 5 cc. of 5% $UO_2(OAc)_2$, 30% AcOH drop by drop with stirring until pptn. is complete, then 10 more drops AcOH and centrifugate the mixt. Pour off the liquid and wash the casein 3 times with a soln. of 5 g. of $UO_2(OAc)_2$ dissolved in 10 cc. of 30% AcOH and made up to 500 cc. with water. The N content of the washed casein × 6.37 = casein. Reference to the original must be made for detn. of *sucrose* and *lactose* since a table of corrections is involved in the calcn. of the lactose content. *Crude fiber* is detd. as follows: Decompose a quantity of fat-free dry substance corresponding to 2 g. of original chocolate in a porcelain dish with 30 cc. of *N* HNO_3. Heat in a tall beaker 120 cc. of *N* HNO_3, add the chocolate and boil for 10 min. with frequent stirring. Wash on to a sand filter (described below) and wash with boiling water until no longer acid. Fill the filter tube with hot 1% NaOH and after 5 min. apply suction. Repeat this treatment with alkali until the crude fiber is yellow or nearly white, wash well with hot water, once more fill the filter with *N* HNO_3, again wash with hot water and then fill with dil. NH_4OH. Finally wash with hot water, alc. and Et_2O in turn. Transfer the contents (sand and fiber) to a Pt dish, dry, weigh, ignite and again weigh. The loss of wt. is the lignin-free crude fiber in 2 g. of chocolate. Analyses of 40 chocolates are shown. To prep. the sand filter fit a glass tube shaped like a small Buchner funnel with a porous plate covered with a filter paper. Then add a 2-cm. layer of sand, another porous plate and a second layer of sand 1–1½ cm. thick. The crude fiber is held in the upper layer of sand. Only this upper layer is transferred to the platinum dish. D. B. DILL

Oriental confectionery. A. HEIDUSCHKA AND P. ZYWNEV. *Z. Nahr. Genussm.* **45,** 61–4(1923).—*White halwa* and *Tachyn* (= sesame) *halwa* are described, with analyses. D. B. DILL

The incidence of research on the baking industry. ELLWOOD HENDRICK. *Chem. Met. Eng.* **28,** 718–9(1923). E. H.

The chemical detection of corn flour in cakes and pastry. K. FRICKE AND O. LÜNING. *Z. Nahr. Genussm.* **45,** 69–78(1923).—The method for detecting corn flour in baked products proposed by Ottolenghi (*Z. Nahr. Genussm.* **8,** 189(1904)) is revised as follows: To 50 g. of the dried powdered sample add 100 cc. of alc. potash (0.3% KOH in 80% EtOH). Heat with a reflux condenser on the water bath 1 hr. and immediately filter through a folded filter into a 250-cc. flask. Distil the EtOH until turbidity develops. Pour into about 1 l. cold water. Add 20 g. of alum and let stand 24 hrs. Decant and collect the ppt. on an 8-cm. smooth filter. Washing is unnecessary. Mix the ppt. in a porcelain dish with 3 times its amt. of sea sand and dry on the water bath. Finely powder and transfer to a long-necked flask with 10 cc. of AmOH. Boil for 1 hr. and filter while hot. When the filtrate is cold, add 3 vols. of benzene and a little kieselguhr. Filter after a few hrs. and wash free of AmOH with benzene. Treat the ppt., freed from benzene, in a small flask with 10 cc. of aq. 3% KOH and filter. Add Esbach's reagent (10 g. of picric acid and 20 g. of citric acid in 1 l. of water) to the clear filtrate. Turbidity proves the presence of corn flour. D. B. DILL

Detection of milk in pastry. G. KAPPELLER, A. GOTTFRIED AND W. REIDEMEISTER. *Z. Nahr. Genussm.* **45,** 65–9(1923); cf. *C. A.* **15,** 1949; **16,** 3516.—Baked products made with and without milk were examd. for total alkalinity of the ash and CaO content. The alkalinity of the ash of white flour products made without milk is usually below 2.0 cc. *N* NaOH per 100 g. of dry substance. When milk is used this value ranges

from 2.0 to 4.3 cc. The CaO content (mg. per 100 g.) was rarely above 100 in the absence of milk solids and rarely below 100 in their presence. D. B. DILL

Correlations between various characters of wheat and flour as determined from published data from chemical, milling and baking tests of a number of American wheats. JACOB ZINN. *J. Agr. Research* **23**, 529–48(1923).—A study is presented of the relationship of the different characters of wheat such as crude protein contents and of the protein, gluten and gliadin contents of flour, vol. of loaf, etc., based on published data obtained from the analyses of a number of American wheats. F. C. COOK

Calculation of the milling yield of flour. F. SCHOLLER. *Z. Nahr. Genussm.* **44**, 348–51(1922); cf. *C. A.* **14**, 81.—The milling yield of wheat and rye flour may be approx. detd. from the formula $A = 100[2 - (P/G)]$, where A is the milling yield, P is the starch content of the flour and G is the starch content of the bran. D. B. DILL

Present abuses in the spice trade. C. GRIEBEL. *Z. Nahr. Genussm.* **45**, 52–60 (1923).—The adulteration of spices is discussed. Pepper has been adulterated with corn flour, wheat flour, extd. ginger, sawdust and especially often with ivory-nut flour. Cinnamon has been adulterated with foreign plant materials and with sand. Suitably colored corn meal or corn flour and turmeric are adulterants for paprika. The addn. of ground cardamon shell to cardamon powder was noted. D. B. DILL

The detection of horse meat and offals by biological reactions. E. CÉSARI. *Ann. fals.* **16**, 82–101(1923); cf. *C. A.* **17**, 1088.—A review of theoretical principles, technic of various methods, comparison of the value of the results, and conditions under which they could be used for detecting adulteration. A. PAPINEAU-COUTURE

Feder's value. PANNWITZ AND HARDER. *Z. Nahr. Genussm.* **44**, 344–8(1922); cf. *C. A.* **7**, 3170; **16**, 597, 3984.—Analyses of 102 samples of freshly chopped meat showed Feder's values exceeding 4 in only 2 cases. In these added water was present. D. B. DILL

The composition of the mayonnaise of meat salad. A. BEHRE, A. DÜRING, H. EHRECKE AND K. THIMME. *Z. Nahr. Genussm.* **44**, 333–6(1922).—The compn. of 10 samples of mayonnaise is reported. Water was frequently incorporated in excessive quantities by the use of flour. D. B. DILL

Hydrocyanic acid in Phaseolus lunatus and other beans. C. B. SERRANO. *Philippine Agr.* **11**, 163–75(1923).—The wild variety of *Phaseolus lunatus* contains 0.06–0.24% HCN, the semi-wild variety 0.049–0.055%, the cultivated 0.03%, green beans of the wild variety 0.03%, and green cultivated beans 0.011%. *Phaseolus mungo, Psophocarpus tetragonolobus,* and *Vigna sinensis* contain no HCN. There is a gradual loss of HCN in powd. beans exposed to room temp., and in whole beans exposed to sunshine. Heating whole beans under vacuum for 1 hr. at 100° removes 76.74% of the HCN. About 95% of the HCN is removed by boiling with H_2O for 2 hrs.; but enough HCN remains to give the beans a bitter taste. Boiling with AcOH completely drives out HCN. If then treated with $Ca(OH)_2$ soln. to remove the sour taste, they are relished by guinea pigs. W. H. FRY

Report on crude fiber. G. S. FRAPS. *J. Assoc. Official Agr. Chem.* **6**, 333–44 (1923).—Samples of wheat bran, cottonseed and alfalfa meals were analyzed for crude fiber by 21 collaborators using 3 methods. The method proposed by the last referee (*C. A.* **15**, 2370) with references to the assay flask deleted and a change in the wording of the linen requirement is given the preference over other methods by the referee but should be further studied in view of criticisms offered before final adoption as official. H. A. LEPPER

Green fodder silage, composition, feed value and use. NILS HANSON. *Kgl. Landtbruks-Akad. Handl. Tids.* **61**, 413–34(1922).—Second cuttings from meadows alone or when mixed with 30 to 50% green legumes made good silage. The siloing process breaks down a large portion of the original pure protein into peptones and amino acids. These have the same feed value as pure protein. Even in the best made silage 10 to 20% of the N compds. are changed to ammonia, which has no protein value. C. O. SWANSON

The sunflower as a silage crop. H. N. VINALL. U. S. Dept. Agric., Bur. Plant Ind., *Bull.* **1045**, 1–32(1922); *Physiol. Abstracts* **7**, 379.—Chem. analyses are given. H. G.

Phenol-chlorine water pollution (effect on canned food) (KOHMAN) **14.** Internal decline of lemons (BARTHOLOMEW) **11D.**

UKERS, WILLIAM H.: All About Coffee. New York: The Tea and Coffee Trade Journal Co. 70s. Reviewed in *Science Progress* **17**, 672(1923).

Apparatus for evaporating milk. H. S. MELLOTT. U. S. 1,451,839, Apr. 17. Balls of steel or other inert material are placed in a horizontal rotating jacketed evapg. drum on the inner surface of which milk is evapd. in film form, in order to free the evapg. surface from adhering particles.

13—GENERAL INDUSTRIAL CHEMISTRY

HARLAN S. MINER

German (chemical) industry. VICTOR CAMBON. *Chimie et industrie* **9**, 597–614 (1923).—An address. A. PAPINEAU-COUTURE

Theory of rational rectification. A. SOREL. *Bull. assoc. chim. sucr. dist.* **4**, 105–9(1922).—A qual. review of the theory of rectification. W. L. MCCABE

Chemical testing of transformer oils. J. KRYSPIN. *Rept. Fuel Tech. Inst. Czech. Polytechnic Highschool in Prague for 1921*, 73–80(1922).—Analytical methods used up to the present time in the examn. of transformer oils are investigated and modifications suggested to minimize analytical errors. 26 samples of oils marketed in Czechoslovakia were analyzed and the results are tabulated. Proposed standard specifications are given. D. F. BROWN

The utilization of animal waste. H. BECHHOLD. *Z. angew. Chem.* **36**, 185–8 (1923).—A lecture outlining the customary methods for utilizing packing house waste. Of special interest is the prepn. of blood serum, albumin, (the best varieties of which are used as a substitute for eggs in cooking), adhesives, stock foods and blood-charcoal. W. C. EBAUGH

(Report of A.C.S.) committee on occupational diseases and hazards in the chemical trades. L. W. FETZER. *Ind. Eng. Chem.* **15**, 535–7(1923).—Brief abstracts of a no. of articles in the committee's field appearing during 1922 are included. E. J. C.

Industrial hygiene and prevention of accidents in chemical industry. G. WOLFF. *Schweiz. Chem. Ztg.* **281**, 295–8, 311–4(1922).—The dangers to workers include overexertion, overwork and exposure to heat, cold, fire, dust, splinters of metal to the eyes and excessive sound waves. Special instances are cited to show the dangerous occupations due to mech., chem. or bacterial causes. Enforced cleanliness and instruction regarding dangers and means of avoidance are urged. Dangerous metallic and org. compds. are listed as well as the industries in which infection is prevalent, particularly tuberculosis. Hygienic measures are emphasized. H. C. HAMILTON

New mine rescue apparatus, "Audos," of the Hanseatic Apparatus Company in Kiel. D. MÜHLEFELD. *Kali* **16**, 87–9(1922).—This belongs to the group of regenerating devices whereby the expired air is deprived of CO_2, then is enriched with O and breathed again. The app. is described in detail with the aid of 3 illustrations. L. W. RIGGS

FRIES, AMOS A. and WEST, CLARENCE J.: **Chemical Warfare.** New York: McGraw-Hill Book Co., Inc. 445 pp. $3.50.

GILL, A. H.: **Engine Room Chemistry.** New York: McGraw-Hill Book Co. 174 pp. $2.00. Reviewed in *Ind. Eng. Chem.* **15**, 544(1923).

KARAFFA-KORBUTT, W.: **Discussion on Chemistry for Work-Inspectors** (in Russian). Petrograd: Gosisdat. 107 pp.

Official Directory of Members of the Association of British Chemical Manufacturers with Classified List of their Manufactures. 166, Piccadilly, London, W. 1.: The Association of British Chemical Manufacturers, Inc., 319 pp. 10s. 6d. Reviewed in *Ind. Eng. Chem.* **15**, 542(1923).

PILE, SEYMOUR and JOHNSTON, REGINALD: **A Tested Method of Laboratory Organization.** London: H. F. and G. Witherby. 7s. 6d. Reviewed in *Chem. Trade J.* **72**, 358(1923).

VILLAVECCHIA, G. VILLORIO: Dizionario di Merceologia e di Chimica Applicata. Vol. I. Abelmosco-Cuscuta. 4th Ed. Milan, Italy: Ulrico Hoepli. 871 pp. 35L.

"Where to Buy" Everything Chemical. London: S. Davis & Co. 200 pp. 2s. 6d. Reviewed in *Chemistry and Industry* **42**, 219(1923).

Evaporation. N. TESTRUP. Can. 229,051, Mar. 27, 1923. In evap. app. a revolving drum is caused to take up and maintain a thin uniform film of liquid; heat is applied to the inside of the drum by the compression of the vapor of the liquid to such an extent that it will cause a small rise in temp. and means are provided for keeping the outer surface of the drum free from scale.

Solid substances with a controlled degree of dispersion. V. KOHLSCHÜTTER. Can. 229,948, Mar. 27, 1923. In the production of solid substances with a controlled degree of dispersion in order to obtain properties which specially fit the substance for certain reactions, a solid substance having a selected mol. space vol. corresponding to the desired degree of dispersion of the product is treated with a fluid reagent so as to cause the product to be produced within the space occupied by the initial solid material without material change of vol. of the initial material. *E. g.*, a Ni catalyst is prepd. by $NiSO_4$ contg. water of crystn., heating to 150° powdering and treating with a 10% soln. of Na_2CO_3; the hydroxide is then dehydrated at 200° and reduced in H at 400°.

Conducting furnacing operations. L. B. SKINNER. Can. 230,032, Apr. 3, 1923. In effecting reaction between reagents yielding a fusible non-volatile reaction product such as HCl and salt cake the reaction mixt. is advanced along a calcining hearth heated from above, the temp. above the hearth being above the fusion point of the product and that of the hearth below its upper surface being below the fusion point of the product.

Filtering and thickening slimes, etc. A. L. GENTER and G. C. JONES. U. S. 1,452,151, Apr. 17. In filtering liquid from solids and thickening the remaining solid constituents, a plunger is reciprocated to put the liquid under pressure on one side of the filtering medium and the pressure is intermittently relieved to allow the back pressure of the filtrate to exert a cleansing action on the filter.

Utilizing ammonia for refrigeration. J. F. WAIT. U. S. 1,452,009, Apr. 17. Free NH_3, released at low pressure from chem. reactions, is absorbed in H_2O or other solvent; the soln. is heated to drive off NH_3 and the vapors are cooled under high pressure to liquefy the NH_3. The liquefied NH_3 is utilized by expansion evapn. for refrigeration and is then utilized in the chem. reaction.

14—WATER, SEWAGE AND SANITATION

EDWARD BARTOW AND G. C. BAKER

Chlorine treatment of water supplies. VOLLMAR. *Gas u. Wasserfach* **65**, 649–54 (1922).—Good filtration results can be judged by bacterial counts. A satisfactory water is one with less than 100 bacteria per cc. and no *B. coli* in 25 cc. Raw waters contg. 2000 *B. coli* per l. when treated with $Ca(OCl)_2$ showed no *B. coli* in 100 cc. in several hrs. High water stage, with resulting high bacterial content, was successfully treated with $Ca(OCl)_2$. The treated waters showed the presence of spore formers only, which proved harmless (non-pathogenic). Cl gas app. is illustrated and described. Disagreeable taste did not result in the above treatments. MARTIN E. FLENTJE

Water chlorination apparatus and its control. G. A. H. BURN AND A. E. BERRY. *Contract Record* **37**, 195–9(1923); *Can. Eng.* **44**, 298–302(1923); cf. *C. A.* **17**, 165.—Wallace and Tiernan liquid Cl machines, including the new pedestal or vacuum type, and their operation are described and illustrated, particular attention being given to the compensator, gas measuring devices and mixing and feeding equipment. The Prov. Bd. of Health requirement for the treatment of all doubtful supplies where Cl alone is used is that there shall be maintained a residual Cl content of not more than 0.3 and not less than 0.2 p. p. m. after 15 min. contact. The technic of the *o*-tolidine test for free Cl is described. Eighty % of all municipal water supplies in Ont. are now chlorinated. R. E. THOMPSON

Phenol-chlorine water pollution. E. F. KOHMAN. *Ind. Eng. Chem.* **15**, 518 (1923).—Medical tastes developed in canned food as the result of using water which had been contaminated by the effluent from a coke plant and which had been subsequently chlorinated. Tastes were probably due to the production of chlorophenols. G. C. B.

Water softening at Columbus, Ohio. Results and studies. C. P. HOOVER. *Eng. News-Record* **90**, 671(1923).—The total cost of softening water at Columbus during the past 14 yrs. has averaged $22.9 per million gals. of which $16.38 was for chemicals. To reduce the hardness 1 p. p. m. it has taken 10.7 lbs. CaO or 11.5 lbs. Na_2CO_3 per million gal. Tests indicate that reaction between the chemical added and the Ca and Mg in the water is immediate. Ninety % of the reaction takes place in the mixing basin, 3% in the 15 hrs. through the settling basins and 7% in passing through the filters. Av. hardness in river water is 273 p. p. m., influent to settling basins 119, outlet of basins 113, and filtered water, 101. These figures indicate that large settling basins are not necessary. Filters are more effective in removing colloids than settling basins. Both

the Columbus and the new Newark, O., plants are arranged so as to add all of the chemicals to 25% of the water with subsequent mixing with the remaining 75%. The addn. of $Al_2(SO_4)_3$ with the lime and soda improves the character of the floc. A *CO_2 plant* consisting of a coke burner and blower for sucking gases from burner to absorber was tried. The CO_2 enters at bottom of the absorber and water dropping onto a revolving disk dissolves the gas. The carbonated H_2O from the absorber contains as high as 600–700 p. p. m. CO_2. About 171 lbs. CO_2 are required to carbonate 1 m.g.d. of Columbus softened water. FRANK BACHMANN

Solving the feed-water problem at New Orleans. O. P. ADAMS AND PAUL F. HOOTS. *Power* **56,** 596–9(1922).—Mississippi River water is used after treatment with lime, soda ash and copperas. Hardness is reduced from 4–15 to 2–6 grains per U. S. gallon and suspended matter from 5–125 to 1.2 grains per U. S. gallon. D. B. DILL

The chemical treatment of feed water. ANON. *Power* **56,** 984–6(1922).—Types of hardness and methods of treatment are described. D. B. DILL

Corrosion—its cause and cure. ANON. *Power* **56,** 532–3(1922).—Corrosion of com. iron and steel by ordinary water may be prevented by removal of dissolved O. The *Kestner degasser* for removing dissolved oxygen from feed water is illustrated and described. D. B. DILL

Note on the determination of temporary hardness in water. W. R. ATKIN AND A. GARDNER. *J. Soc. Leather Trades Chemists* **7,** 87–90(1923).—The use of methyl orange for this detn. requires a clearly defined color for end point, and a perceptible amt. of acid is necessary to cause the color change. Tetrabromophenolsulfonephthalein (bromophenol blue) changes color between $p_H = 2.8$ and $p_H = 4.6$ with a sharp end point at $p_H = 3.8$. Alizarin, used in boiling soln. as indicator, has a range of color change near true neutrality $p_H = 7.0$ and is extremely sensitive to acids. A preliminary titration is made and then a second one in which most of the acid required is added and the soln. boiled before the alizarin paste is added. A stock soln. consisting of AcOH and AcONa is made up to have a p_H value = 3.8, thus enabling the operator to obtain the correct shade in a blank titration. A table shows agreement between solns. contg. alizarin and bromophenol blue indicators. The end point is clearer and the titration more convenient where bromophenol blue is used. W. H. BOYNTON

The volumetric determination of sulfates in sea water. JOSÉ GIRAL. *Anales soc. espan. fis. quim.* **20,** 577–85(1922).—To 30 cc. of sea water add about 0.4 g. $BaCrO_4$ dissolved in 100 cc. of 1% HCl. Boil 2 min., neutralize with pure $CaCO_3$, filter, and wash the ppt. The filtrate will contain the CrO_4 ion in amt. exactly equiv. to the SO_4 in the original sample, and the analysis is completed by adding KI and titrating with $Na_2S_2O_3$. The detn. of SO_4 in samples of sea water indicates that the ratio of SO_4 to Cl is variable. The actual amt. present varies from 2.10 g. to 2.53 g. SO_3 per l. L. E. GILSON

Hydrogen-sulfide formation at the bottom of the lake of Onega. K. K. GILZEN. *Bull. acad. sci. Russie* **1918,** Series VI, 2232–40.—The appearance of H_2S at the bottom of the lake of Onega was observed during a dredging investigation. Samples of slimes, taken from points where H_2S was found, were of a creamy consistence, yellowish gray when dry and contained about 6.5% of humus matter. Compn. of the dry mass showed SiO_2 52.6%, Al_2O_3 8.94, Fe_2O_3 9.08, and S 0.3%. The org. matter contained large quantities of detritus and Diatomacea. The formation of H_2S was due to bacterial decompn. of inorg. sulfates and org. material contg. S. There was a total exclusion of light, a const. temp. of 4°, and a pressure of 4–8 atm. M. G. KORSUNSKY

Carbon dioxide springs in the territory of Montepulciano. GAETANO CASTELLI. *Rass. min. met. chim.* **58,** 14–5(1923).—At Montepulciano in the Sant' Albino region are natural CO_2 springs. The zone covers an area approx. 500 m. square, and is made up of various Pliocene rocks. The fissures are filled with slightly opalescent H_2O, through which the gas issues, causing an appearance of boiling, though the H_2O is only slightly above 0° and the CO_2 5–10°. Several hundred m.³ of CO_2 per day are evolved with an av. compn. CO_2 95.40%, O 0.33%, N 3.13%, combustible gas 0.14%, and H_2S trace. Suggestions are made for leading the gas into deep storage wells, from which it can be drawn through towers to wash out the H_2S, and thence to compressors. Calcns. show that, by this process, compressed CO_2 could be marketed much cheaper than that manufd. from coke. C. C. DAVIS

The building and care of filters. A. REICH. *Gesundh. Ing.* **46,** 54–5(1923).—A brief review. MARTIN E. FLENTJE

Progress in the building of automatic waterworks. GEIL. *Wasser u. Gas* **13,** 226(1923).—The automatic waterworks installation at Schiedam is described. MARTIN E. FLENTJE

What cities must spend annually for their water supplies. C. B. BURDICK. *Eng. News-Record* **90**, 27(1923).—The av. city of 100,000 must spend about $5,200,000 for new waterworks construction during 23 yrs. Operation and fixed charges make the cost of water approx. $6.24 per capita. FRANK BACHMANN

Experiments on formation of floc for sedimentation. E. S. HOPKINS. *Eng. News-Record* **90**, 204–5(1923).—Expts. were carried out at the Montebello Filters, Baltimore, on a mixing basin 118′ wide, 191′ long and 18′ deep, baffled so as to give 24 channels 8′ wide. The total distance traveled by the water is 0.56 mile with a detention of 31.8 min. at 128 m.g.d. rate. It was shown that samples taken at the extreme end of the basin always settled in the shortest time at all velocities. Good mixing was obtained after passing the first few "turns" at baffles but less time for sedimentation was noted at each subsequent "turn." FRANK BACHMANN

The determination of the velocity and volume of ground waters. HERMANN KOSCHMIEDER. *Gesundh. Ing.* **46**, 49–53(1923).—Several modified formulas are given. MARTIN E. FLENTJE

Determining sub-surface water flow electrically and chemically. J. W. TOYNE. *Eng. News-Record* **90**, 698(1923).—A central well 12″ diam. was surrounded by 2½″ wells at a radius of 6 ft. and at a depth of 155 ft. into the gravel formation at South Bend, Ind. About 200 lbs. of salt and basic fuchsin were placed in the central well. The surrounding wells were equipped with electro-couples connected with the 110 volt lighting circuit through an ammeter. Current readings and samples were taken hourly. It was found that 82 hrs. were required for a flow of 5 ft. FRANK BACHMANN

Use of copper sulfate at Hartford and effect on filter runs. J. E. GARRETT. *Eng. News-Record* **89**, 1124–5(1922); cf. *C. A.* **17**, 167.—Microörganisms, principally *Asterionella* and *Uroglena*, shortened runs on the filters at Hartford, Conn. The use of 2.3 lbs. $CuSO_4$ per million gal. reduced the number of organisms and aided in increasing the filter runs. FRANK BACHMANN

Copper sulfate keeps down Najas gracillima. J. F. JACKSON. *Eng. News-Record* **90**, 500(1923).—By the use of $CuSO_4$ this growth was eliminated. It is somewhat similar to eel grass and the only trouble experienced was its accumulation on the intake screens. FRANK BACHMANN

Kosmos ice plant is electrically operated. ANON. *Power Plant Eng.* **27**, 455–60 (1923).—A lime-soda cold process softener decreases the hardness of Lake Michigan water used for the manuf. of ice, giving a better product and a reduction of core pumping. A complete description of the plant is given. G. C. B.

Treatment of water contaminated by mine drainage. J. W. LEDOUX. *Eng. News-Record* **90**, 698(1923).—Five methods are considered: (1) neutralization by lime and soda ash which leaves impractical amts. of Na_2SO_4 in the water; (2) neutralization with lime, removal of ⅔ of the SO_4 by heating to 356° F., and treating the remaining H_2O with soda (the final H_2O would contain 270 p.p.m. Na_2SO_4 and cost 15 c. per 1000 gal.); (3) neutralization with lime and evapn., costing 32 c. per 1000 gal.; (4) $Ba(OH)_2$ treatment costing 45 c. per 1000 gal.; and (5) first removing ⅔ of $CaSO_4$ by heat, then treating with $Ba(OH)_2$, costing 28 c. per 1000 gal. Ba treatment is expensive but offers the most promise. Safeguards to prevent danger from poisoning can be successfully used. FRANK BACHMANN

Germicidal effect of acid mine drainage in Pennsylvania. W. L. STEVENSON. *Eng. News-Record* **90**, 713–4(1923).—See *C. A.* **17**, 1521. FRANK BACHMANN

Water and sewage plants in Minnesota. J. A. CHILDS. *Eng. News-Record* **90**, 673(1923).—Of the 400 water systems in Minn., 38 are surface supplies, 20 of which receive some kind of treatment. Of 80 sewage treatment works, 17 are septic tanks and 63 are Imhoff tanks. Only 45 of the Imhoff tanks are adequate in size. F. B.

Sewage treatment progress in Chicago Sanitary District. LANGDON PEARSE. *Eng. News-Record* **89**, 1008–13(1922).—See *C. A.* **17**, 167. FRANK BACHMANN

The present status of sewage treatment in England. G. W. FULLER. *Eng. News-Record* **90**, 206–8, 252–4, 299–301(1923).—Impressions are given of various works with discussions on the administration and policy question, status of older types of treatment, and the outlook for the activated-sludge process. Since the war much attention has been given to "performance-commensurate-with-cost" in reconditioning existing works or by installing new ones. The control of stream pollution by river conservancy boards is successful and is commended to Am. consideration. Sewerage systems are usually built on the combined plan. Treatment plants are designed for 3 times the dry weather flow and from 3 to 6 times the dry weather flow is treated as storm water. Trade wastes influence materially the compn. of English sewages. Chem. pptn. of sewage is on the wane. Detritus and sedimentation tanks are built on much greater

detention periods than in the U. S. Septic tanks are disappearing. Imhoff tanks were not installed extensively. Sep. sludge digestion is practiced successfully. Sludge utilization at Bradford was of interest as sewage grease was sold during the war for £150,000 annually. The grease is sepd. from the sewage by addn. of H_2SO_4. Contact beds are losing ground whereas trickling filters have a good record. Filter beds with $2^3/_4$″ stone generally are free from clogging. Humus tanks of Dortmund type with 2-hr. detention are common. In the activated-sludge process the sewage is clarified before aeration to a greater extent than in the U. S. Nitrification is not sought as clarification and stability are obtained by successful removal of the colloidal org. matter. Less air is required, which might be due to better clarification before aeration, less nitrification, presence of metallic salts or presence of Fe. Development of mech. circulation devices to replace diffusion for reducing power requirements is noteworthy. Power costs $9 per million gals. with current at 1.4 c. kw. Waste activated sludge is usually mixed with other sludge for disposal. FRANK BACHMANN

A colorimetric method of analysis for sewage and effluents. R. C. S. WALTERS AND V. G. PICKERING. *Engineer* **134**, 602(1922).—The amt. of neutral tint of sewage effluents was measured with the Lovibund tintometer. The amt. of O absorbed in corresponding samples was detd. by the acid permanganate method after 3 hrs.' digestion. Very close agreement between the O absorbed and the color tests was found. D. B. D.

Fixation of atmospheric nitrogen by activated sludge. C. L. PECK. *Eng. News-Record* **90**, 487–9(1923).—Conclusions are that conditions favorable to *Crenothrix* with upwards of 2 p. p. m. of Fe_2O_3 seems necessary for N fixation. Some of the expts. show increases of 65% of N attributed to fixation. Where fixation was successful 848 lbs. per day of dry sludge per 10,000 people was obtainable. The sludge had an NH_3 content of 7.92%. FRANK BACHMANN

Economics of the activated sludge process. C. L. PECK. *Eng. News-Record* **90**, 522–6(1923).—Where power costs do not exceed 2 c. per kw. hr. and the amt. of sewage treated exceeds 1 m.g.d. the net cost of treatment should range between $20 and $30 p.m.g. This cost includes sludge disposal, and interest and amortization at 10% per annum. Sedimentation, skimming and aeraton before activation is recommended. Agitation by mechanisms instead of diffusers will reduce cost. The use of catalysts to reduce power consumption is suggested. Dewatering of sludge by acid-heat flotation, Maclachlan process or Oliver filters are practical. FRANK BACHMANN

Milwaukee activated sludge plant to use vacuum filters. T. C. HATTON. *Eng. News-Record* **90**, 203–4(1923).—After 5 yrs. of testing with filter presses, centrifuges and other devices, 30 drum filters, each 12′ diam. by 14′ long, of the Oliver type, have been purchased to dewater the activated sludge from the sewage plant under construction. Conditioning of the sludge by heating to 120–180° F. and keeping the p_H value between 3.3 and 4 with H_2SO_4 will produce about 65 lbs. of 80% moisture sludge per 24 hrs. per ft.² of filter surface. These filters require 2 different vacuums namely, 22 and 11 in., the first to pick up and the second for draining. FRANK BACHMANN

Imhoff tanks and sprinkling filters for Champaign and Urbana (Ill.). PEARSE, GREELEY AND HANSEN. *Eng. News-Record* **90**, 152(1923).—The activated sludge process and Imhoff tank-sprinkling filter systems were considered. Owing to lower operating cost the latter was decided upon. Cost data were based on 2.5 m.g.d. and power at 2.9 c. per kw.-hrs. The operating cost of the activated sludge process was estd. at a total charge of $65,500 per annum as against $46,800 for the Imhoff-sprinkling filter system. FRANK BACHMANN

New system of sewage treatment at Graham, Texas. H. E. ELROD. *Eng. News-Record* **90**, 620–2(1923).—This system is known as the Sept-Aer-Sed system. It is primarily an activated sludge plant with a septic tank preceding the aeration unit. The plant was designed for 0.3 m.g.d. The inventor claims absence of excess sludge to be disposed of. What becomes of the sludge is a mystery unless it finds its way into the final effluent. This plant is operated only during the day, the night flow being stored. A stable effluent with low turbidities is obtained. FRANK BACHMANN

Unique sewage works and pump-equipment bid plan. G. D. HOLMES. *Eng. News-Record* **89**, 1121–4(1922).—The Syracuse sewage will pass through bar screens with 3″ openings, grit chambers, mech. raked bar screen with $^1/_2$″ openings, and then be pumped to plain sedimentation tanks equipped for continuous removal of sludge. The sludge will be pumped to the lime waste beds of the Solvay Process Co. where it will mix with 10 times the amt. of lime required for sterilization. FRANK BACHMANN

Converting Columbia slough into sewage outlet. W. P. HARDESTY. *Eng. News-Record* **90**, 397–9(1923).—By dyking and enlarging the slough, dilu. is afforded part of the sewage of Portland, Ore. FRANK BACHMANN

Municipal waste disposal in Iowa. E. L. WATERMAN. *Eng. News-Record* **90,** 633–4(1923).—Information from cities of more than 7,000 population was obtained. Cost and methods of disposal are tabulated. FRANK BACHMANN

Garbage and refuse used for land filling at Ottawa. G. H. WILSON. *Eng. News-Record* **90,** 106(1923).—An incinerator was discarded and the garbage and refuse were used to fill in low land. By the use of ashes, earth and disinfectants offensive odors have been kept down. FRANK BACHMANN

Sewage treatment for isolated houses and small institutions where municipal sewage is not available. B. E. PARRY. *Pub. Health J.* (Can. Pub. Health Assoc.) **14,** 27–31, 62–7(1923).—Chem. privies and septic tanks and their operation are described. An area of ground may be safely used every 3 or 4 months for burying the contents of chem. closets. It is noted that typhoid bacilli may remain alive for days on vegetables sprinkled with infected water and that butter made from infected cream may contain this bacillus for a considerable time. R. E. THOMPSON

Sanitary and storm sewer system for the city of London, Ont. H. A. BRAZIER. *Contract Record* **37,** 45–7(1923).—The system will serve 445 acres and was designed to give a minimum velocity of 2.5 ft. per sec. The sanitary sewers were constructed of vitrified fire clay and the storm drains of concrete. R. E. THOMPSON

The action of "overflow sewers" on disposal systems. HERMANN KURZ. *Gesundh. Ing.* **46,** 73–9, 85–91(1923).—A complete discussion of the use, design, and need of overflow sewers of improved design is given. A bibliography is included. M. E. F.

New outfall sewer and sewage works at Los Angeles. J. A. GRIFFIN AND W. T. KNOWLTON. *Eng. News-Record* **89,** 1116(1922).—Report on progress of sewer construction and emergency sewage-works on Ballona Creek. The sewage plant is being designed to treat 40 sec. ft. and will consist of Imhoff tank trickling filter system. FRANK BACHMANN

Constitution and purification of waste waters from the flax retting industry. S. STOOF. *Preusz. Landesanstalt für Wasserhyg. zu Berlin-Dahlem; Gesundh. Ing.* **46,** 16–23(1923).—Various means of purification, both chem. and biol., are discussed. MARTIN E. FLENTJE

Serious water-borne typhoid outbreak at Cochrane, Ontario. F. A. DALLYN. *Eng. News-Record* **90,** 714(1923). FRANK BACHMANN

Industrial hygiene and prevention of accidents in chemical industry (WOLFF) **13.** Water for use in retting fibers (KRÄNZLIN) **25.**

Regenerating exchange silicates. J. M. MAXWELL. U. S. 1,450,985, Apr. 10. A bed of H_2O-softening exchange silicates after use is treated with an upward current of fresh H_2O under pressure sufficient to cause disturbance of the granular material of the bed, and after draining the bed is flooded with salt soln., drained to the top of the bed, again treated with salt soln. and drained and washed.

Apparatus for softening water with zeolites. J. E. CAPS. U. S. 1,452,288, Apr. 17.

Treating sewage sludge. J. P. BALL. U. S. 1,452,335, Apr. 17. Sewage sludge is subjected to centrifugal action with intermittent acceleration of speed automatically regulated by a hydrometer.

15—SOILS, FERTILIZERS AND AGRICULTURAL POISONS

J. J. SKINNER

Some relations of organic matter in soils. F. A. CARLSON. Cornell Agr. Expt. Sta., *Memoir* **61,** 27 pp.(1923).—Expts. were made for 10 years on the Dunkirk clay loam to det. the effects of various treatments and cropping systems on the accumulation of org. C and N in soils. Plots in rotation with legumes contained more N than did plots in rotation without legumes. The increase was greater in limed plots than in unlimed. There is a close relation between org. C and N. J. J. SKINNER

The influence of precipitation on soil composition and on soil organic matter maintenance. F. J. STEVERS AND H. F. HALTZ. Washington Agr. Expt. Sta., *Bull.* **176,** 31 pp.(1923).—Soils from several sections of the state where different climatic conditions existed were analyzed. Soils receiving about 8 in. of pptn. annually contain about 1/4 as much N in the surface 6 in. as those receiving about 20 in. annually. The ratio between the N and C remains practically const. Variations in pptn. have no influence on the amt. of total P and K in the soil. The Ca content of the soil is slightly influenced

by pptn. The Ca exists as a silicate as the soils are formed from basaltic rock. Variations in pptn. have little influence in the org. matter content of the subsoil. The N-C ratio of the subsoil is slightly narrower than that for the corresponding surface soil. J. J. SKINNER

The moisture equivalent of heavy soils. A. F. JOSEPH AND F. J. MARTIN. *J. Agr. Sci.* **13**, 49–57(1923).—The % of moisture retained by soil, which has been drained centrifugally by a force of 1000 times that of gravity for 40 mins., is studied with a view to establishing relationships between moisture equiv. and such additional important soil properties as salinity and alky. This equiv. of a normal soil diminishes as the wt. taken for the detn. increases. Dil. solns. of $CaSO_4$, NH_4NO_3 or $(NH_4)_2SO_4$ reduce the moisture equiv., while Na_2CO_3 increases it, though gradual increased concn. of this salt first diminishes then increases the moisture equiv. to a max., after which it is further diminished. The p_H value was higher in those soils that were easily water-logged than those that were not easily water-logged. Though the colloidal content of clay seems related to its moisture equiv. it does not appear to be true of kaolin or $Al(OH)_3$. R. B. DEEMER

Factors affecting soil reaction. I. The soil-water ratio. R. M. SALTER AND M. F. MORGAN. *J. Phys. Chem.* **27**, 117–40(1923).—A study was made of 9 acid soils, with soil-H_2O ratios varying from 1:1 to 1:3125. The velocity of sucrose hydrolysis was also studied with soil-H_2O ratios from 1:0.0894 to 1:625. The electrometric detn. agreed with the sucrose hydrolysis method in indicating a systematic variation of H-ion concn. with variations in soil-H_2O ratio. In general the changes in H-ion concn. at varying soil-H_2O ratio agreed with a distribution of H ions between soil and soln., such as would be expected if the mechanism were one of adsorption. Calcns. were made by using the formula of Freundlich $x/m = B \times C^d$, where x = amt. adsorbed, c = concn. of soln., m = mass of adsorbent and B and d are consts. Conclusion: The soil reaction depends upon (1) the total dissociated acid present, (2) the adsorptive capacity of the soil for the H ion and (3) the soil-H_2O ratio. M. S. ANDERSON

Comparison of the use of lime and ground chalk for the correction of soil acidity in the Caux region (France). CH. BRIOUX. *Bull. soc. ind. Rouen* **50**, 388–409(1922).—From a large number of expts. which are described in detail, it follows that finely ground chalk is practically equiv. to com. quick or slaked limes, when equal amts. of CaO are used. A. PAPINEAU-COUTURE

Experiments on nitrification and hydrogen-ion concentration. T. GAARDER AND O. HAGEM. *Sonderdr. Bergens museums aarbok* 1919–20; *Naturvidensk. raekke* 1920, No. 6, 31 pp.; *Physiol. Abstracts* **7**, 380.—The optimum H-ion concn. for nitrate formation is at the neutral point (p_H = 7.0), and that for nitrite formation at p_H = 7.8. H. G.

The colorimetric determination of hydrogen-ion concentration in soils. C. T. GIMINGHAM. *J. Agr. Sci.* **13**, 69–73(1923).—A short account is given of the results obtained in an attempt to overcome the difficulties due to turbidity of soil exts. by using a displacement or percolation method. The results are offered as suggestive of further investigation. R. B. DEEMER

Report on sulfur in soils. W. H. MACINTIRE. *J. Assoc. Official Agr. Chem.* **6**, 320–9(1923).—A study of the detn. of S in soils was made by collaborators using a concd. HNO_3 digestion of the soils followed by a pptn. of the Fe and Al by NH_4OH, then detn. of the S as $BaSO_4$. Several variations in details of procedure were made. Digestion for 1 hr. with concd. HNO_3 gave higher S values than when digested for 2 or 3 hrs. It was assumed that the larger amt. of Fe in soln. after the longer digestions was responsible for occlusions of S. When a known amt. of S was added to the soil before digestion it was in no case fully recovered. The influence of Fe and Al upon the amts. of S occluded was studied by taking different amounts of a synthetic soln. contg. these elements and adding a detd. amt. of sol. SO_4. Increasing the amt. of Fe and Al in a given vol. had a marked effect in decreasing the S recovered as $BaSO_4$. M. S. ANDERSON

The estimation of nitrates in soils by the phenoldisulfonic acid method. C. T. GIMINGHAM AND R. H. CARTER. *J. Agr. Sci.* **13**, 60–2(1923).—Inaccuracies in the method were traced to the quality of the filter paper used. Emerson's modification (*C. A.* **16**, 2948) is the one studied. R. B. DEEMER

The value of mineralogical examination in determining soil types, with a method of examination and a comparison of certain English and Scottish soils. J. HENDRICK AND G. NEWLANDS. *J. Agr. Sci.* **13**, 1–17(1923). R. B. DEEMER

Effect of cropping upon the active potash of the soil. G. S. FRAPS. *J. Assoc. Official Chem.* **6**, 329–31(1923).—A study was made of the effect of cropping upon the active K in soils, and also of the K content in the crops grown. Corn and sorghum were grown in pots contg. 5000 g. of soil to which P and N were added, so that the crop

would be limited only by K. Detn. was made of the K sol. in 0.2 *N* HNO_3, and of the total K in the plants. The study included 409 samples. The K_2O in plants varied from 39 to 964 p. p. m., while the decrease in active K_2O in the soil varied from 17 to 338 p. p. m. The ratio of K_2O in the plants to the decrease in active K_2O in the soil was approx. a const. Conclusion: The K removed by crops, in pot expts., is related to the active K of the soil; and the decrease of active soil K is related to the K removed by the crops.
M. S. ANDERSON

The "alkali" content of soils as related to crop growth. F. T. SHUTT AND ALICE H. ATACK. *Trans. Roy. Soc. Can.* **16,** Sect. III, 233–40(1922).—The limit of Na_2SO_4 and of Na_2CO_3 in the chief root-feeding zone is, resp., for wheat 0.5 to 1 and 0.06 to 0.07%, for oats 0.9 to 1 and 0.2%, for western rye grass 0.2% Na_2SO_4, for native prairie grass 1% Na_2SO_4, for onions 0.2% Na_2CO_3, for timothy 0.7% Na_2SO_4, and for vetch and rye 0.2% Na_2CO_3.
A. T. CAMERON

Further studies of alkali soils in Iraq. J. F. WEBSTER AND B. VISWANATH. *Mesopotamia Dept. Agr. Mem.* **5,** 46 pp.(1921); *Expt. Sta. Record* **47,** 811–2.—In a continuation of studies previously noted (*C. A.* **16,** 778), the action of various salts on the physical properties of the soil was first studied. Conclusion: When the soil soln. in a soil which has a moisture content equal to its minimum capillary capacity to a depth of 4 ft. has an osmotic pressure of more than 6 atm., the soil may be considered too saline for ordinary agricultural purposes, especially for such crops as wheat and sorghum. H. G.

Action of salt solutions on soil. O. NOLTE. *Landw. Vers-Sta.* **98,** 135–53(1921); *Expt. Sta. Record* **47,** 19–20.—The chloride, sulfate, and nitrate of Na increased the permeability of the soil, but it gradually reverted to its original condition. When the soil was washed out it became heavily puddled. This condition was removed by adding $CaSO_4$ or NaCl soln., the action of the former being the more marked in this respect. The 3 Na salts caused an increase in the amt. of N, potash, and lime in the seepage water and a decrease in the P_2O_5, as long as the salt soln. was active and the lime content of the seepage water was high. When the salt soln. was washed out, the P_2O_5 content of the seepage water increased. Na phosphate soln. decreased the permeability of the soil. A further decrease resulted after washing the soil. The lime content of the seepage water was small. Na_2CO_3 decreased the permeability still more, and almost complete imperviousness resulted from subsequent washing. $NaHCO_3$ considerably increased the permeability, which was reversed by washing. The reaction of the seepage water was weakly alk. and its contents of lime and P_2O_5 were small. These increased considerably after washing. The chlorides of K and NH_4 had the same effect as NaCl. The action of KCl was more marked than that of NH_4Cl. The chlorides of Mg, Ca, and Ba had the same general effect. The permeability was greater with the last two than with the first, and the decrease in permeability after washing was less where the last two salts were used. The content of P_2O_5 in the wash water was not so great with these salts as with NaCl, otherwise these wash waters were similar. The chlorides of Al, Fe, and Si, $SnBr_4$, and PCl_5 all increased the permeability of the soil by either large or small amts. Subsequent washing increased the permeability. The permeability of the soil was increased more by water satd. with CO_2 than by pure water. The lime content of the seepage water was greater by treatment with CO_2 water than with pure water. The sulfate and phosphate of Ca increased the permeability more than pure water, but this was decreased by subsequent washing. $CaCO_3$ had about the same influence on soil permeability as water. $Ca(OH)_2$ decreased soil permeability and washing caused puddling. The N content of the seepage water was greater than with pure water. $Ca(HCO_3)_2$ increased the permeability, but subsequent washing decreased it.
H. G.

Composition of the soil and its preparation. J. G. YAMANDI. *Rev. Soc. Rural Cordoba (Argentina)* **21,** 6007–26(1922); *Expt. Sta. Record* **47,** 317–8.—Brief general information is given on the phys., mech., and chem. compn. of agricultural soils, together with a discussion of the factors in their prepn. and cultivation of importance to the growth of crops, with particular reference to the soils of Argentina. H. G.

Report on experimental investigations on the use of aluminium sulfate on alkali land on Reclamation Service projects. C. S. SCOFIELD. *Reclam. Rec. (U. S.)* **13,** No. 1, 4-5(1922); *Expt. Sta. Record* **47,** 27.—Alkali soils which have become impervious to water due to the presence of gelatinous silicates may be reclaimed by the use of $Al_2(SO_4)_3$. When applied to an alk. soil it neutralizes the alky. through the formation of an insol. Al silicate, the Na of Na silicates uniting with the sulfate of the $Al_2(SO_4)_3$ and remaining in soln. as a neutral salt, which may be leached out by heavy irrigations.
H. G.

Soil cultivation and fertilization from the standpoint of supplying the plant with

carbon dioxide as the most important agricultural raw material. H. KASERER. *Arb. deut. Landw. Gesell. Österr.* No. 9, 3–14(1921); *Expt. Sta. Record* **47**, 815.—Moisture, light, and CO_2 are the most important factors affecting the prosperity of green plants. Cultural and fertilization practices favoring CO_2 production in soil are described. Expts. with potatoes and oats showed that an intimate mixture of nitrogenous fertilizers and stable manure gave much better yields than either fertilizer used alone. H. G.

Profit and risk of potash fertilizer. A. JACOB. *Kali* **16**, 10–3(1922).—Plots were arranged in 4 series of 7 plots each (28 in all) and were treated as follows: (1) no fertilizer, the other 6 received Thomas meal and $(NH_4)_2SO_4$, (3) received in addn. potash-magnesia sulfate, (4) K_2SO_4, (5) K_2SO_4 and kieserite, (6) KCl, (7) KCl and kieserite, in each case at the rate of 150 kg. K_2O per hectare. The addn. of K regardless of the form in which it was used gave an increase of 4 to 9% over plot 2 which received only N and P. A repetition of the test the following year gave an increase of 6 to 12% in favor of plots receiving K. L. W. RIGGS

Influence of fertilizers containing borax on the growth and fruiting of cotton. J. J. SKINNER AND F. E. ALLISON. *J. Agr. Research* **23**, 433–43(1923).—Results obtained with cotton grown at Arlington Expt. Farm, Va., and at Muscle Shoals, Ala. are recorded. Borax was mixed with a 4–8–4 fertilizer and the applications were made at the rates of 5, 10 and 20 lbs. of anhyd. borax per acre. In a 3rd test the borax was applied in amts. varying from 1 to 400 lb. per acre. Small quantities of borax injured young plants at both Arl. Farm and Muscle Shoals. On the silt loam at Arl. Farm when the fertilizer was applied broadcast, 5 lb. applications of borax were not always injurious, 10 lbs. were slightly injurious and 20 lbs. distinctly so. The latter applications reduced the wts. of green plants 15–35%. When the borax was applied in the drill and the seed planted at once the injury was more pronounced. When the fertilizer was applied and remained until after a rain before planting the seed, the effect of the borax was less severe. Somewhat similar results were obtained at Muscle Shoals. F. C. COOK

"Reformphosphate." O. REITMAIR. *Chem.-Ztg.* **47**, 205(1923).—Claiming that raw phosphates of certain kinds are good fertilizers, and that this effect is increased by producing porosity in them, R. treats the rock with small quantities of dil. acids (sufficient to convert the $CaCO_3$ into $Ca(HCO_3)_2$), and calls the product "Reformphosphate." (European patents applied for.) W. C. EBAUGH

Report on insecticides and fungicides. J. J. T. GRAHAM. *J. Assoc. Official Agr. Chem.* **6**, 313–20(1923).—The work of 1922 on insecticides and fungicides consisted of a coöperative study of the hydrazine distn. method for total As. The official distn. method gave unreliable results in the presence of nitrates. Only 2 of the 15 analysts participating obtained as high results with the official method as by the hydrazine method. Most of the analysts found higher results by the official method when titrated immediately, than when allowed to stand 24 hrs. With the hydrazine method the titrations made after 24 hrs. standing checked closely with those obtained with the fresh distillate. The only objection to the hydrazine method is the cost of hydrazine which is not excessive. This method was recommended for adoption as the official method. M. S. ANDERSON

The coloring of white arsenicals used in stock dipping: precautions to safeguard life. CHAS. F. JURITZ. *J. Dept. Agr. Union S. Africa* **6**, 253–61(1923).—To serve as an effective warning the colors used must be those not naturally occurring in food, drink, or medicine, *i. e.*, blue or violet. The pigment or dye should impart a distinct color to the solid poison as well as to its aq. soln., a condition considering cost, etc., difficult to obtain with any one coloring matter alone. Expts. were carried out with various mixts. of Na arsenite and coloring matters, a mixt. of laundry blue and gentian violet giving the best results. Powd. Na arsenite was distinctly colored by the addn. of 1% laundry blue. The presence of 0.005% of gentian violet gave a highly colored aq. soln. Both the solid and liquid showed little change in color when exposed to the light for 8 weeks. No change occurred in the solid kept in the dark. The cost of the coloring matters was about 3.5% of the cost of the Na arsenite. K. D. JACOB

Arsenite of soda as a locust poison. C. W. MALLY. *J. Dept. Agr. Union S. Africa* **6**, 220–32(1923).—Na arsenite spray solns. contg. treacle as a bait deposit on the bottoms of the drums, on standing, a layer of tough whitish putty-like material which contains a considerable portion of the As. After thorough agitation with the supernatant liquid this material again rapidly settles out, weakening the spray soln. and resulting in a considerable loss of As. Numerous expts. showed that the addn. of a sweetening agent such as treacle was unnecessary and that a pure aq. soln. of Na arsenite was equally effective against locusts. Dusting with powd. Na arsenite proved very

effective under all weather and temp. conditions. This method of application is of distinct advantage where H_2O is scarce. The insect's bodies are themselves sufficiently moist to enable the dust to grip and be absorbed. With locusts Na arsenite acts as a contact poison rather than as a stomach poison as generally supposed. The effect of Na arsenite upon locusts during their different stages of growth is described. Numerous dusting machines for handling powd. Na arsenite are described and discussed.
K. D. JACOB

The influence of K on the development of plants and their morphological and anatomical structure, with special reference to agricultural crops (WIESSMANN) **11D.**

16—THE FERMENTATION INDUSTRIES

C. N. FREY

The Girard-Lusson number of wine brandy. EMIL MESZLENYI. *Z. Nahr. Genussm.* **44**, 351–3(1922).—The Girard-Lusson no. of authentic Rumanian wine brandies is abnormally low, usually ranging from 260 to 280. D. B. DILL

Detection of arsenic in methylarsinated wines. E. FLEURY. *J. pharm. chim.* **27**, 178–9(1923).—Arrhenal (*A*) has been added to wines as a denaturant, but these prepns. are not recognized in the Codex. To detect As, evap. 50 cc. of the wine, treat the residue with 5 cc. of pure H_2SO_4 and a few drops of HNO_3 and incinerate to white or gray. Take up with dil. HCl, filter until clear, then add 9 vols. of Bougault's reagent (H_3PO_2; Codex 1908), and heat on a water bath for 30 min. If no brown pptn. or coloration takes place, As is absent. A wine contg. 0.1 g. *A* per l. gave on standing for 12 hrs. a black, flaky ppt. S. WALDBOTT

Tank cars for wines. J. GUÉNOT. *Chimie et industrie* **9**, 402(1923).—Lining tank cars with bakelite is not practical owing to the high temp. required. Tinning (by spraying process) or application of a bituminous coating can be successfully carried out only on condition that the surface is perfectly dry, as traces of moisture cause peeling off of the coating in a very short time. A. PAPINEAU-COUTURE

Determination of the melting point of brewery pitch. B. LAMPE. *Wochenschr. Brauerei* **39**, 109(1922); *Chimie et industrie* **9**, 367(1923).—Suck the melted pitch up into a thin-walled tube 3–4 mm. in diam. and allow to solidify. Cut off a portion exactly 10 mm. long, attach to a tube of equal size by means of rubber tubing, and pour 5 g. of Hg on top of the pitch. Attach to a thermometer and heat in a water bath at the rate of 1° per min. Take as the m. p. the temp. at which the Hg begins to flow out of the bottom of the tube. A. PAPINEAU-COUTURE

Saccharification of wood (HÄGGLUND) **22.**

17—PHARMACEUTICAL CHEMISTRY

W. O. EMERY

The vitamin content of certain proprietary preparations. KATHARINE H. COWARD AND A. J. CLARK. *Brit. Med. J.* **1923**, I, 13–5.—Tests on metagen, maltoline, roboleine, virol, vitmar, and Mellin's Food showed A and B present in all except maltoline (tests negative for A with the amts. employed). The A content was in all cases less than that of butter from grass-fed cows, and less than 1/100 of that in active cod-liver oil specimens. The B content was in all cases less than that of wheat germ or of yeast. In none of the cases have the manufacturers succeeded in concg. vitamins on the commercial scale. No advantage is to be gained in trying to obtain vitamins in the form of drugs.
A. T. CAMERON

An adulteration of ergot. G. TANRET. *Ann. fals.* **16**, 73–6(1923); cf. *C. A.* **16**, 2197.—T. found ergot contg. 15–18% of grains having the outward appearance of ergot; but consisting of wheat flour paste dried and colored by ordinary black (Fe-tannin) ink and carmine. Also in *Bull. sci. pharmacol.* **30**, 8–11(1923). A. PAPINEAU-COUTURE

The use of hydrogen peroxide in the manufacture of perfumes. F. UTZ. *Deut. parfum. Ztg.* **8**, 183–4(1922); *Chimie et industrie* **9**, 327(1923).—H_2O_2 does not affect anethole, anisole, bornyl acetate, eucalyptole, Siberian pine oil, and thymol. A. P.-C.

The oil contents of different varieties of cinnamon trees. A. ROLET. *Parfumerie moderne* (Oct. 1922); *Industrie chimique* **10**, 123(1923).—The bark of *Cinnamonum*

zeylanicum yields an oil contg. 58–76% of *cinnamaldehyde;* oil from the roots contains a negligible amt., and oil from the leaves contains 70–75% *eugenol* and 3% cinnamaldehyde. Oil from the bark of any portion of *C. cassia* contains 80–90% cinnamaldehyde. The bark of the roots and twigs of *C. loureiru* yields 1.17 and 0.2%, resp., of oil contg. 27% of aldehyde and 40% of *linalol,* eugenol, and *eucalyptol.* Oil of *C. barmani* contains 77% aldehyde and 11% eugenol. Oils from the bark of *C. camphora, C. oliveri, C. pethenocylon, C. pedalinervium, C. mercadoi, C. sintok, C. tamola canella alba* contain little or no aldehyde and can be used only for their camphor and safrol contents. A. P.-C.

Process of manufacture of synthetic perfumes. A. LEWINSOHN. *Riv. ital. ess. profum.* **4,** 102–4(1922); *Chimie et industrie* **9,** 553(1923).—The soly. of *phenylethyl alc.* (I) in water renders its use difficult in the extn. of oil of roses, and it must be recovered with Et_2O. Its synthesis, which is theoretically simple, offers certain difficulties in practice. I, first indicates the prepn. of benzyl cyanide, of phenylacetic acid, and of ethyl phenylacetate, which is the starting point in the prepn. of I. To 3.020 kg. of ethyl phenylacetate, 0.200 kg. of metallic Ca shavings, and 18.6 kg. of abs. alc. in a large Fe vessel equipped with a Cu cooling worm, add 3.5 kg. of metallic Na in 5 or 6 portions, promptly closing the vessel after each addn., so that reduction is complete in about 20 min. The mass is immediately treated with dil. alc. to destroy excess Na, and then with H_2O. The bulk of the alc. is recovered by distn. The aqueous residue contains NaOH and I, which is removed by repeated extn. with Et_2O, which on evapn. gives I, b_{760} 218–219° in 65% yield. There remain some ethyl and Na phenylacetates.

A. PAPINEAU-COUTURE

Genuine, spurious and adulterated cubeb. ANON. *Ber. Afdeel. Handelsmuseum Koloniaal Inst.* **11,** 8 pp.(1923).—The genuine cubeb, *Piper cubeba* var. *katoentjar* is distinguished from var. *badek* and from *P. ribesioides* and other species by the carmine-red color obtained by treatment with concd. H_2SO_4 and by the formation of crystals by sublimation. The related species, *P. mollissimum, P. clusii, P. guineense, P. bornonense* and *P. lowong,* are also classed as spurious cubeb. A. W. DOX

Nicotine and tobacco waste. A. D. HONE. *Can. Advisory Council, Sci. Ind. Research Rept.* **4,** 40 pp.(1919).—A study of the relative merits of various methods of extn., with special regard to efficiency, purity of product, cost and condition of stems after extn. Extn. with hydrocarbon seems most promising. It shares with steam distn. the advantage of producing a soln. of any desired strength. It lends itself readily to small-scale operation with simple appliances. W. O. E.

Silver arsphenamine. W. H. GRAY. *J. Chem. Soc.* **123,** 635–42(1923).—If an excess of Et_2O be used for pptn. from MeOH soln., a solid can be obtained from the reaction mixt. of arsphenamine and $AgNO_3$ having the same Ag content as that of Ehrlich and Karrer (*C. A.* **10,** 64). If, however, the alc. soln. be added to a comparatively small quantity of Et_2O, a H_2O-sol. solid is pptd. contg. As, Ag and Cl in the atomic ratios 2:7.1:6.4. This contains more Ag and less As than could correspond to a coördinated compd. It consists, therefore, of colloidal AgCl, reversibly sol. because of the small amt. of As compd. now pptd. with it, the chief constituent of which is probably the hitherto undescribed *diaminodihydroxyarsenobensene dinitrate* (pale yellow, granular, sol. in H_2O, MeOH or EtOH, decompg. on heating without melting). This view is supported by the observation that in more concd. dry MeOH solns. AgCl is pptd. without the addition of Et_2O. Under similar exptl. conditions, solns. of Na Ag arsphenamine in MeOH yield colloidal Ag_2O, reversibly sol. in H_2O. All the Ag is removed from aq. solns. of both Ag arsphenamine and Na Ag arsphenamine by aq. picric acid, because of the simultaneous pptn. of the $(AsC_6H_3(OH)NH_2)_2$ as an insol. *dipicrate* (deep yellow powder, m. 142° with decompn.). From the solid products so obtained, the picrate is readily removed by AcMe, leaving solids rich in AgCl and Ag_2O, resp., but contg. only a small amt. of As. Like Paal's colloidal Ag, pptd. by acid from sols contg. Na protalbinate or lysalbinate (*Ber.* **35,** 2224), these are insol. in H_2O but sol. in alkali. In Na Ag arsphenamine, it is probable that colloidal Ag is present as well as Ag_2O, since a comparatively large amt. of As is not pptd. by picric acid, indicating that oxidation of the arsphenamine by the Ag_2O has occurred; whereas in Ag arsphenamine the % of As pptd. is the same as in the case of arsphenamine alone. The oxidation products of arsphenamine, 3-amino-4-hydroxyphenylarsenious oxide and the corresponding acid, are not pptd. by picric acid under these conditions. The results seem to indicate conclusively that to the properties of $(AsC_6H_3(OH)NH_2)_2$ and its salts as protective colloids must be ascribed the phenomena observed in their reactions with $AgNO_3$. Among other data, complete analyses of some specimens of com. Na Ag arsphenamine are given in the exptl. part. W. O. E.

Coöperation between chemist and perfumer. II. H. J. PRINS. *Perfumery*

Essent. Oil Record **14**, 79–80(1923).—An amplification of the author's previous article on the same subject. Cf. *C. A.* **17**, 1689. W. O. E.

Use of fluosilicates as economic poisons, and composition of uba, styxol, nicoschwab and tanatol. H. MATTHES AND G. BRAUSE. *Pharm. Ztg.* **68**, 227–8(1923).—Attention is called to the danger involved in the unrestricted sale and indiscriminate use of sol. fluosilicates, notably Na_2SiF_6, now extensively used in the eradication of rats, mice, roaches, etc. The prepns. uba, styxol, nicoschwab and tanatol contain, resp., 73.5, 68.4, 54.1 and 90.7% Na_2SiF_6. W. O. E.

Testing of digitalis leaves. C. DE L. V. WYNGAARDEN. *Gen. Nat. Gen. en Heelkunde; Nederland. Tijdschr. Geneeskunde* **66**, i, 24(1922); *Physiol. Abstracts* **7**, 454.—The influence of drying the leaves in different temps. upon their physiological value (detd. in cats by the method of Hatcher) was investigated. Immediately after drying no differences are found, but it appears that after a year the value has remained the most constant in leaves which had been dried at 55°. H. G.

Pharmacological evaluation of guaiacol preparations. F. VERZAR. *Klin. Wochschr.* **2**, 1213(1923).—Guaiacol, injected subcutaneously, increases the flow of saliva from the sublingual gland of dogs. The rate of flow is directly proportional to the amt. of guaiacol injected. The pharmacol. effect may persist for from 1 to 2 hrs. M. H.

Organic, protein and colloidal silver compounds; their antiseptic efficiency and silver-ion content as a basis for their classification. J. D. PILCHER AND TORALD SOLLMANN. *J. Lab. Clin. Med.* **8**, 301–10(1923).—The antiseptic value of Ag salts and org. and colloidal Ag compds. may be detd. by their action on the yeast fermentation of sugar. Detns. with aq. solns. permit the grouping of the commercial products into 5 types, which correspond with the clinical groups: (1) $AgNO_3$ type, 63.5% active Ag; (2) Protargin fortissimum, 16.8%; (3) Protargol type, 7.05%; (4) Collargol type, 1.34%; (5) Argyrol type, 0.32%. The presence of NaCl reduces the activity of all the compds. to a low level, but is more nearly representative of clinical conditions of prolonged contact. E. R. LONG

Arsphenamine—some factors which influence its colloidal properties. A. E. SHERNDAL. *J. Lab. Clin. Med.* **7**, 723–32(1922).—A no. of arsphenamines were prepd. by varying the process of reduction and pptn. The method of reduction produces certain differences in the characteristics of the arseno base, in regard to stability and extraneous impurities. On conversion into the dihydrochloride pptn. by means of ionized solns. yields in every case products definitely more gelatinous than those produced when anhydrous non-electrolytes are used. This is explained by the fact that arsphenamine is inherently a colloidal substance, and that electrolytes in certain concn. produce coagulation of the disperse phase of its emulsoid sols. These macroscopic observations on the colloidal variability of arsphenamine suggest a similar difference in the disperse state of solns. prepd. for intravenous injections. E. R. LONG

Biological assay of pituitary extract. E. E. NELSON. *J. Lab. Clin. Med.* **8**, 318–33 (1923); cf. *C. A.* **16**, 3712.—KCl and histamine are not suitable substances for the standardization of pituitary ext. Since no other material available has an action qualitatively similar to that of pituitary ext., a prepn. of the gland itself should be used as a standard. The oxytocic and pressor substances in the gland are not identical; therefore the pressor method should not be used in the assay of this drug, which has its chief use in oxytocic action. E. R. LONG

Deterioration of procaine solutions. M. L. BONAR. *J. Lab. Clin. Med.* **8**, 391–4 (1923).—There is no deterioration in the anesthetic properties of procaine solns. standing over a period of months, and no increase in toxicity or irritability except in case of gross contamination. The development of a yellow color appears to be the result of oxidation, and is no index of change in anesthetic, toxic or irritative properties. The sediment frequently seen in procaine solns. may be due to the growth of molds. Such contamination may be evident long before increase in toxicity or irritability develops. E. R. LONG

Alkaloids of monkshood (Aconitum septentrionale Koelle). GUNNAR WEIDEMANN. *Arch. exptl. Path. Pharm.* **95**, 166–80(1922).—*Aconitum septentrionale* yielded two alkaloids. The first, lappaconitine, $C_{32}H_{42}N_2O_8$, m. 223°, contains 3 MeO groups, hydrolyzes to lappaconine, $C_{23}H_{32}NO_7$, and lappaconic acid, $C_9H_9NO_5$. The second, septentrionaline, $C_{33}H_{46}H_2O_9$, amorphous, m. 131°, contains 4 MeO groups, and hydrolyzes to $C_{25}H_{39}NO_7$ and $C_8H_9NO_3$. G. H. SMITH

Powdered thyroid gland, its assay and detection of adulteration. H. FABRE AND H. PENAU. *J. pharm. chim.* **27**, 81–8(1923); cf. *C. A.* **17**, 1040.—Defatted, dried and powdered glands of hogs contained 0.3048% I, beef 0.4127, mutton 0.399, horse 0.290% I; however, these amts. are not const., because of many modifying conditions.

To detect added *iodized albumin* (*A*) mix 0.5 g. with 1 cc. NH_4OH and 9 cc. 95% EtOH, filter, evap., take up with H_2O, filter to remove fat, then add 10% $FeCl_3$ soln. and $CHCl_3$. On shaking, *A* is revealed by a violet color; with pure thyroidin, $CHCl_3$ remains colorless. S. WALDBOTT

Collection of lycopodium in Poland. J. MUSZYNSKI. *Pharm. J.* **110,** 64(1923).—In N. E. Poland, 10,000 to 16,000 kg. of lycopodium are collected yearly. Fully ripe (yellow) spikes of *Lycopodium clavatum* yield 17.25% of pure drug, 14.5% when peduncles are gathered with it, and 10% when in addn. it is admixed with part of the stem, 6-12 cm. long. Small, unripe spikes yield 1.2% less. Young, relatively undeveloped spikes yield not more than half of the stated % amts. S. WALDBOTT

The arsenic and lead limits of the British Pharmacopeia. D. B. DOTT. *Pharm. J.* **110,** 138-9(1923).—D. prefers Marsh's test to any form of the stain test, which, *e. g.*, in hypophosphites is unreliable. From the table of Self (*C. A.* **17,** 1302) limits of safety in As and Pb content may be calcd. for each substance, but a proper degree of purity should also be a detg. factor. The min. As limit might safely be raised to 5, that of Pb to 10 p. p. m. S. WALDBOTT

Euphorbia pilulifera. E. M. HOLMES. *Pharm. J.* **110,** 162-3(1923); cf. POWER and Browning, *C. A.* **7,** 2659.—The "Queensland asthma herb" known since 1880 and described by J. H. Maiden (1889) as being derived from *Euphorbia pilulifera*, Linn., is in reality the herb of *E. hirta*, Linn. or *E. pilulifera*, Jacquin. H. summarizes the botan. characters of the plant. S. WALDBOTT

Note on the use of cypress oil. W. A. POUCHER. *Pharm. J.* **110,** 181-2(1923); cf. *C. A.* **17,** 1302.—The use of this oil as a "fixator" for perfumes is suggested, as its odor after partial evapn. resembles that of ambergris. A type example is given. S. W.

Physical incompatibilities. PIETRO CHIARIA. *Groin. farm. chim.* **71,** 197-202 225-31(1922).—A discussion of phys. incompatibilities in pharmacy due to insoly., pptn., immiscibility of liquefaction of solids. A. W. DOX

Liver oil of *Squalus acanthias* (BERLINGOZZI, TOMASINI) **27.**

BARROWCLIFF, M. and CARR, F. H.: **Organic Medicinal Chemicals (synthetic and natural).** London: Baillière, Tindall and Cox. 331 pp.

HOEVE, J. VAN DER, ITALLIE, L. VAN, and STUMPFF, J. ED.: **Aethylhydrocupreine of optochine.** Leiden: A. W. Sythoff. 42 pp.

Solution of dichloramine-T. F. H. YOUNG. U. S. 1,451,857, Apr. 17. A soln. of dichloramine-T in chlorcosane is obtained by first dissolving the dichloramine-T in PhCl, and subsequently, when required for use, dilg. a portion of this concd. soln. with the required amt. of chlorcosane. The resulting soln. is adapted for use on wounds.

Mercurial composition for intravenous injection. H. M. SPENCER. U. S. 1,451,850, Apr. 17. Hg is so dispersed with gum arabic that when mixed with H_2O in the proportion of more than 5 mg. Hg per 100 cc. a liquid isotonic with normal blood is obtained.

18—ACIDS, ALKALIES, SALTS AND SUNDRIES

FRED C. ZEISBERG

The Kestner acid pump. ANON. *Engineering* **115,** 431(1923).—The pump is designed for use in H_2SO_4 manuf. E. H.

The Muscle Shoals hydro-electric nitrogen-fixation plant. JOHN FRAZER. *Chimie et industrie* **9,** 615-21(1923). A. PAPINEAU-COUTURE

Preparation of potassium salts from leucite and from other potassium silicates. E. PATERNÒ. *Giorn. chim. ind. applicata* **5,** 14(1923).—Claiming priority (1919) in discovery of the process of prepg. K salts from leucite and from other K silicates by treating the finely powdered minerals with NaCl soln. in the hot under pressure. R. S. P.

Utilization of the ashes of marine plants from Lybia. L. LOSANA AND P. E. CROCE. *Ann. chim. applicata* **7,** 37-9(1923).—A study of the ash of marine plants, consisting chiefly of *Zostera*, washed ashore on the Lybian seacoast. The ash, obtained at the lowest possible temp., was approx. 29.1% of the dry plant, was of a uniform grayish white color and analyzed in %: SiO_2 1.47, CaO 12.05, Fe_2O_3 1.27, Al_2O_3 0.48, TiO_2 0.0013, MnO 0.083, MgO 8.31, Na_2O 27.84, K_2O 1.68, Li_2O trace, Cl 36.29, Br 0.061, I 0.127, H_2S 0.085, CO_2 2.82, P_2O_5 0.195, SO_3 6.25. Though low in I, Br and K, attempts were made to develop a process for recovering them by fractional crystn. of the sol.

portion of the ash (approx. 60%). The mother liquors after 5 crystns. were strongly acidified with H_2SO_4, treated with a current of Cl to displace Br and I and the Br and I recovered in the usual way. From 25 kg. of ash were obtained 32 g. of I and 10 g. of Br. Large-scale recovery should be economical, since most of the evapn. could be effected by solar energy and the I recovered by methods similar to those used with crude nitrate liquors in Chile. C. C. DAVIS

Chlorine bleaching compounds. MAURICE DE KEGHEL. *Rev. prod. chim.* **26**, 183–8(1923).—A description of bleaching powder, its properties, prepn., analysis and utilization and of the prepn. of Javel water. A. PAPINEAU-COUTURE

Ozone generators and the industrial application of ozone. F. E. HARTMAN. *J. Soc. Chem. Ind.* **42**, 117–26T(1923).—The development of the technology of ozone lies in three directions: (1) in reactions where small concns. of O_3 produce relatively large results, such as in the bleaching of oils, textiles, etc., the purifying of water and the preservation of foodstuffs; (2) in reactions where O_3 acts as a catalyzer, as in drying of paints and varnishes; and (3) in the production of fine chemicals. The development of O_3 generators is reviewed. The use of O_3 reduces the time necessary to dry linseed oil to the touch by 50% or more with a finished surface of superior quality. With O_3 the samples dried in the dark as rapidly as in diffused or direct sunlight. O_3 is very effective against molds and is advantageous in the manuf. of nut butters, and oleomargarins, and in the milling of flour. W. H. BOYNTON

Ozone and ozonizers. F. E. HARTMAN. *Chem. Age* (N. Y.) **31**, 125–9(1923); cf. preceding abstract.—A discussion of the vital factors governing the design and operation of water ozonizers to furnish the basis of assaying the value of a particular design and to touch upon some promising applications of O_3 to industrial and research chemistry. O_3 ruptures the unsatd. compds. contg. ethylene linkages at the double bond, converting them into aldehydes and ketones. In the absence of H_2O, the ozonide is formed by a direct addition of O_3 at the double bond. Addition of water at this point causes decompn. into ketones and H_2O_2. W. H. BOYNTON

Talc and soapstone. Their mining, milling, products and uses. R. B. LADOO. Bur. Mines, *Bull.* **213**, 132 pp.(1923). E. H.

Determining the value of decolorizing charcoal. E. SPÖRRY. *Chem.-Ztg.* **47**, 203–5(1923).—Usually equal wts. of charcoal are added to identical amts. of the liquid to be decolorized, and the resultant decolorized solns. are then compared with one another. But in practice charcoal must be used in quantities sufficient to produce a liquid of definite color, and a truer detn. of the decolorizing power can therefore be made by finding out how much of the various kinds of charcoal are needed to decolorize equal amts. of solns. to this required degree. Expts. with Carboraffin extra, Carboraffin, Darco Norit 1st quality, and Purit were made by both methods, and it was shown that second by the first were not comparable with those by the second, and that those by the results method were more like those obtained in actual practice. W. C. EBAUGH

The decolorizing action of bone black. P. M. HORTON. *Ind. Eng. Chem.* **15**, 519–20(1923). –Bone black owes its power of removing color to active amorphous C formed by the low-temp. decompn. of org. compds. Since the activity can be renewed by dry ignition only as long as N is present, the N compds. probably serve as a reserve capable of supplying fresh active C. This C surface is coated with a layer of ash or hydrocarbons and can be activated only by removal of this film. This can be effected with sucrose or wood charcoal by selective oxidation, with highly siliceous material (rice hull charcoal, etc.) by boiling with NaOH and with bone black by H_2O or dil. acids. This theory is to be elaborated further. C. C. DAVIS

The corrosion of lead and its alloys by sulfuric acid (LASSIEUR) **9**. Carbon dioxide springs in Montepulciano (CASTELLI) **14**.

Aluminium, including Bauxite and Cryolite. London: H. M. Stationery Office. 31 pp. 1s. 6d.

ANDREEV, I.: **Nitrogen Compounds (in Russian).** Petrograd: Wissensch. Chem.-tech. Staatsverlag. 42 pp.

Mineral Industry of the British Empire and Foreign Countries. Strontium Minerals (1913–1919). Imperial Mineral Resources Bureau. London: H. M. Stationery Office. 12 pp. 3d.

Halogen acids. F. S. LOW. U. S. 1,451,399, Apr. 10. $SiCl_4$, $TiCl_4$ or other halide which combines with H_2O is vaporized and the vapor is directly treated with H_2O vapor to produce the corresponding acid.

Borax and boric acid. A. KELLY. U. S. 1,450,975, Apr. 10. See Can. 213,223 (*C. A.* **16**, 1134).

Purifying commercial phosphoric acid. W. H. ROSS, C. B. DURGIN and R. M. JONES. U. S. 1,451,786, Apr. 17. Acid is evapd. at a temp. below 150° to a sp. gr. of 1.85 or higher, then cooled to a temp. below 40°, inoculated with a crystal of H_3PO_4 and centrifuged to sep. the cryst. material from the liquid. The crystals are melted at a temp. above 40°, treated with H_2O to produce a soln. of 1.85 sp. gr. or higher, cooled below 40° and again inoculated with cryst. H_3PO_4 and centrifuged to obtain a further quantity of cryst. material.

Catalyzer for ammonia synthesis. I. W. CEDERBERG. U. S. 1,452,027, Apr. 17. See Can. 219,825 (*C. A.* **16**, 2583).

Apparatus for catalytic oxidation of ammonia. I. W. CEDERBERG. U. S. 1,452,145, Apr. 17. The catalyst employed for oxidizing NH_3 with O is arranged in the flow vessel so that its concn. increases from the inlet toward the outlet end of the vessel. This arrangement serves to avoid overheating. Cf. *C. A.* **17**, 857.

Catalysts for the synthesis of ammonia. L. CASALE. Can. 229,485, Mar. 13, 1923. A catalyst is prepd. from metals of the Fe group or their alloys by subjecting the finely divided material to oxidation with a strong current of O so that the reaction temp. is rapidly reached and some of the metal eliminated by vaporization. The residue of oxide is cooled and crushed. A used catalyst may be thus acted upon.

Anhydrous magnesium chloride. P. COTTRINGER and W. R. COLLINGS. U. S. 1,450,912, Apr. 10. MgO is made to react with gaseous HCl, at a temp. of 525–540°.

Potassium from greensand. H. W. CHARLTON and R. N. SHREVE. U. S. 1,452,185, Apr. 17. Greensand is heated to a temp. of about 240° with lime, H_2O and $NaNO_3$ to form KNO_3 and NaOH. U. S. 1,452,186 specifies heating the greensand under pressure with KNO_3 and milk of lime. The KNO_3 serves as an accelerating agent to promote the reaction.

Crude cyanide compounds. H. FREEMAN. Can. 229,767, Mar. 27, 1923. A compd. contg. stable Ca cyanide and Na cyanide is prepd. by heating a mixt. of NaCl, $CaCN_2$ and any substance contg. C which will give up its C during heat treatment, the mixt. contg. only sufficient NaCl to combine with $^1/_2$ the N in the $CaCN_2$. The product is then rapidly cooled to prevent the reverse action taking place.

Bleaching barite. J. B. SCHEUER. U. S. 1,452,315, Apr. 17. Barite ore is reduced to a fine powder, heated with air or other oxidizing agent to oxidize some of the impurities and the oxidized products are removed by H_2SO_4.

Crystallizing apparatus. T. E. STEVENS. U. S. 1,450,992, Apr. 10. The app. is adapted for crystg. Na_2CO_3, Na_2SO_4 or other salts and comprises a receptacle with a cooling jacket and a brush which may be moved in contact with the inner wall of the receptacle to remove crystals. Cf. *C. A.* **16**, 1839.

Burning sulfur. H. S. DAVIS. U. S. 1,451,763, Apr. 17. Tubes of Al or other material of good heat cond. are placed vertically within a mass of S to be burned (which is held within heat-insulating walls) in order to conduct heat from the burning S into the underlying S mass. Cf. following pat.

Burning sulfur. H. S. DAVIS. Can. 229,191, Feb. 27, 1923. S is maintained free burning by associating with it a non-combustible material which accelerates combustion and which has a wick-like absorption for melted S (asbestos, MgO, certain types of porous brick). The S burner may have a pan composed of such material. Cf preceding pat.

Nickel catalyzer. G. A. RICHTER. U. S. 1,451,113, Apr. 10. Metallic Ni is pptd. by the action of granular or feather Zn on a soln. of $NiCl_2$, $NiSO_4$ or other Ni salt while subjected to a grinding action in a ball mill and the Ni is sepd. for use as a catalyzer, *e. g.*, in hydrogenating.

Solid plastic material from casein. F. G. MARIES. U. S. 1,452,086, Apr. 17. Casein or milk curd is soaked in a soln. contg. glycerol, heated with the soln. to dry it, pressed into the desired shape and then treated with a soln. contg. CH_2O, glycerol, $CaCl_2$, H_2O and acetone. Cf. *C. A.* **16**, 801.

Molded sound-record. E. E. NOVOTNY. U. S. 1,451,783, Apr. 17. Grooved faces of sound records are formed of a synthetic resin welded to a backing contg. fibrous material.

Protective coating on magnesium. C. B. BACKER. U. S. 1,451,755, Apr. 17. See Brit. 173,742 (*C. A.* **16**, 1492).

Fireproofing composition. W. L. WOOTTON. U. S. 1,451,485, Apr. 10. A mixt. of $CaCl_2$ 200, NaCl 1, and $CaSO_4$ 1 part is employed for fireproofing wood or other materials.

Fireproofing material. A. ARENT. Can. 229,246, Feb. 27, 1923. Materials are rendered non-inflammable and waterproof by treating them with $SbCl_3$ in a solvent comprising Am acetate. Cf. *C. A.* **16**, 2761.

19—GLASS, CLAY PRODUCTS, REFRACTORIES AND ENAMELED METALS

G. E. BARTON, C. H. KERR

A comparison of French, English, German and Austrian laboratory glassware. P. NICOLARDOT. *Chimie et industrie* **9**, 233–44, 469–84(1923).—N. reviews previous work, describes at considerable length his own expts., comparing them with previous results by others, and reviews and discusses the work of Cauwood, English and Turner (*C. A.* **12**, 212). The most suitable test for rapid classification of glass, from the standpoint of resistance, is heating with water under pressure at 120°, 140°, 160° and even higher, for a sufficient time to obtain appreciable attack of the glass. 0.1 *N* HCl attacks glass less than pure H_2O does at 100°, but more after than before heating with H_2O under pressure. Attack by NH_4Cl is due to the NH_3, not the HCl. High-grade glasswares are resistant, even after prolonged use, English and French glasses being superior to German. Steam does not attack glass as much as water does (at the same temp.) and can be neglected when boiling analytical solns. at atm. pressure. N. gives analyses of the 14 glasses which he investigated, and discusses at great length the effects of the various constituents. This part cannot be satisfactorily abstracted. A. PAPINEAU-COUTURE

Acid- and chemical-proof stoneware. M. A. KNIGHT. *Ind. Eng. Chem.* **15**, 472–3 (1923).—A general description of its manufacture and uses. C. H. KERR

Refractories. H. DROUOT. *Technique moderne* **15**, 1–6, 37–43, 71–5, 104–11, 144–8, 170–6(1923).—A review covering general properties, manuf. and equipment, and details about various refractories. A. PAPINEAU-COUTURE

POWELL, HARRY J.: **Glass-making in England.** New York: Macmillan Co. 183 pp. $10.

Glass. W. C. TAYLOR. U. S. 1,449,793, Mar. 27. The yellow tint imparted to acid borosilicate glasses by Fe oxide is overcome by the addn. of Nd oxide to the batch from which the glass melt is formed.

"Non-slip" quartz tile. M. C. BOOZE. U. S. 1,451,456, Apr. 10. Quartz granules are integrally united with a ceramic bond which is more wearable than the quartz to form a non-slip tile, the surface of which may be restored in general character after some usage by exposure of fresh abrasive grains.

"Non-slip" tile. A. A. KLEIN and M. F. BEECHER. U. S. 1,451,462, Apr. 10. A granular material such as beryl possessing a hardness intermediate quartz and Al_2O_3 is employed with a ceramic bonding material to form tiles, the non-slipping character of the tread of which may be restored after some service by exposure of fresh abrasive grains.

Metallizing ceramic articles. Q. MARINO. U. S. 1,452,281, Apr. 17. See Brit. 172,723 (*C. A.* **16**, 1493).

Self-hardening refractory bricks. W. A. FRANCE. U. S. 1,451,540, Apr. 10. See Can. 219,609 (*C. A.* **16**, 2585).

Bonded articles of magnesia and alumina. R. C. PURDY, M. F. BEECHER and A. A. KLEIN. Can. 229,902, Mar. 27, 1923. A refractory consisting of cryst. MgO and cryst. Al_2O_3 bonded together with $MgO.Al_2O_3$ is prepd. by mixing preshrunk MgO grains with finely divided Al_2O_3 and heating the mixt. below the fusion point of the latter to form $MgO.Al_2O_3$ sufficient to bond the mixt. together.

Refractory containers for molten metals. E. W. HALE. Can. 229,316, Mar. 6, 1923. The lining of a container for molten metals consists of bricks contg. at least 30% Cr. The oxide film formed on the surface of the lining protects the lining from corrosion.

20—CEMENT AND OTHER BUILDING MATERIALS

J. C. WITT

Decrease in fire and in agglutination considered as stages in dead burning. H. KÜHL. *Zement* **11**, 454–5, 462–3, 469–71(1922); *Chimie et industrie* **9**, 313(1923).—A study of the phenomena of contraction and softening during the burning of cement and their relation to clinkering. Five samples were taken in a rotary kiln, corresponding to gradually increasing temps. from 1200° to 1400°. Contraction and softening are quite distinct from clinkering and occur at much lower temps. Contraction corresponds to exothermic reactions first pointed out by Nacken; and softening corresponds to deep-seated reactions between the constituents of cement. Clinkering takes place only at 1400°, and it is essential to reach this temp. in order to obtain the properties required of a good cement, especially constancy of vol. and hardening. A. P.-C.

Kinds of cement and mechanical equipment for their manufacture. ERNST BLAU. *Chem.-Ztg.* **47**, 201–3(1923).—A description of methods and machinery for cement manuf. and specifications for the various kinds made. W. C. EBAUGH

Action of alkali salt on portland cement mortars. D. G. MILLER. *Eng. Contr.* **57**, 359–60(1922); *Expt. Sta. Record* **47**, 291.—The concrete highest in quality, as indicated by strength and absorption, best withstood the deleterious action of $MgSO_4$. H. G.

How "asbestos-protected metal" was developed commercially. J. H. YOUNG. *Chem. Met. Eng.* **28**, 244–7(1923).—Steel sheets dipped in moulten asphalt are coated on both sides with a felt of asbestos satd. with asphalt, contg. hexachloronaphthalene to reduce the fire hazard. The top weather-proof coating is a compounded bitumen of the stearin-pitch type. To prevent the sheets from sticking together, they are coated with a thin coat of viscose and heated to 120° F. The viscose decomposes forming cellulose hydrate. P. F. FLAGG

Refractory cement. W. F. ROCHOW. Can. 229,684, Mar. 20, 1923. A compn. for refractory cement contains powd. SiO_2 rock, calcined SiO_2 and dry powd. Na_2SiO_3.

Cementing oil wells. F. W. HUBER. U. S. 1,452,463, Apr. 17. The space to be cemented is treated with a thin grout formed of port. cement, H_2O and chloride of Ca, Ba_3 or Sr.

Continuous shaft furnace for burning cement, etc. R. THIELE. U. S. 1,451,379, Apr. 10. The pat. relates to reciprocating grate sections.

21—FUELS, GAS, TAR AND COKE

A. C. FIELDNER

The coking of lignites. HANS TRUTNOVSKY. *Braunkohle* **21**, 509–15(1922).—Extensive data are given of the products of the low-temp. coking of lignites from Köflach-Voitsberger, Austria. The H_2O content of most of the crude coals averaged 45–50%, though a few grades rich in tar were approx. 30%. The following data give the yields from 1000 kg. of Zangtaler (45% H_2O) and Köflacher (30% H_2O) lignites, the best and worst grades, resp., the values being in kg. except for the gas: semi-coke, 330, 340; crude tar, 55, 167; H_2O distd., 530, 390; gas, 75.5 cu. m., 73.6 cu. m.; gas benzine, 2.5, 2.5; tar benzine, 3, 10; illuminating oil, 8, 28; fuel oil, 15, 41; paraffin oil, 15, 53; pitch and coke, 11, 12. C. C. DAVIS

By-product coke-oven operation. "10" pushing series. A. COE. *Blast Furnace & Steel Plant* **10**, 619–22(1922).—An attempt is made to prove that with our present knowledge of heat distribution and coking operation the "G," a "10" series, is the best obtainable. Comparison is made with other "10" series such as the K, E, FS, and OZ, also with "11" series. C. T. WHITE

The organization of coal research. R. A. BURROWS. *Fuel* **2**, 27–8(1923).—The formation, scientific importance and coöperation with industry of a research dept. are illustrated by the Lancashire and Cheshire Coal Research Assoc. C. C. DAVIS

Terminology in coal research. MARIE C. STOPES AND R. V. WHEELER. *Fuel* **2**, 5–9(1923).—Though the terminology devised by S. and W. for defining the ingredients of coal is now in general use, terms are frequently misused. Attention is called to the correct characteristics and properties of the ingredients (cf. *C. A.* **13**, 1755, 2585; **14**, 1888, 1889; **16**, 3746). Colored plates representing micro-sections of untreated coal

show the *fusain, durain, clarain* and *vitrain* ingredients in their natural colors. C. C. DAVIS

A study of the constitution of anthracite. ARTHUR GROUNDS. *Fuel* **2,** 10–4 (1923).—Detailed analyses of various grades of anthracite are given in continuation of a study of their constitution (cf. *C. A.* **16,** 3191). C. C. DAVIS

What is coal? ANDRE KLING. *Chimie et industrie* **9,** 389–99(1923).—An address on the constitution and nature of coal, with an outline of a plan for further research in this field. A. PAPINEAU-COUTURE

The examination of coal by reflected light. The colloidal nature of coal. H. WINTER. *Fuel* **2,** 78–82(1923).—A general description, with photographic reproductions, of the present methods of studying coal and similar substances microscopically. Various references are given. C. C. DAVIS

The resolution of coal. F. V. TIDESWELL. *Fuel* **2,** 244–7(1923).—A survey of the problem of the mechanism of the action of solvents on coal, particularly the recent work of Illingworth (cf. *C. A.* **17,** 622). The latter proves no chem. identity or even similarity between the various products of the action of C_5H_5N on coal, and since the compn. and properties of the residue and the ext. differ, objection is taken to the term *depolymerization of coal.* It is more probable that C_5H_5N, apart from its solvent action, (1) decomposes the insol. component to form a series of sol. compds. of differing type; (2) splits off a simple sol. compd. from a complex insol. one, leaving a still complex insol. residue; or (3) causes a mech. resolution of various morphological entities of coal into smaller aggregates, giving access by the solvent to previously protected sol. material. Action (3) is predominant with solvents and (1) and (2) with heat. The conclusion of Illingworth that the higher the C:H ratio, the higher the polymerization, has no exptl. evidence, since heating a coal above its decompn. temp. does not give the same products as resolution by solvents. Resistance to resolution by solvents or by heat increases as the coal passes from bituminous to anthracite, indicating increasing structural complexity, chem. compn. and % of ulmin components. C. C. DAVIS

The spontaneous combustion of coal in relation to its composition and structure. MARIE C. STOPES AND R. V. WHEELER. *Fuel* **2,** 29–41, 83–92(1923).—The chief cause of spontaneous combustion is probably the direct action of O on some ingredient in coal and not the presence of incidental substances like pyrites. New data and observations are given on the constitution and properties of coal with detailed description of known facts under the following headings: the cause of spontaneous combustion, banded structure of bituminous coals, present state of knowledge of the constitution of coal, absorption of O by coal, reaction products, mechanism of the oxidation process, constitution of the C mol., detn. and value of ignition temps., relationship between ignition temp. and O content, true self-heating, friability and the occurrence, properties, sepn. and analysis of the 4 ingredients of banded bituminous coal. By circulating air and O for several weeks in a closed system through fresh powdered bituminous coal at a const. temp. and detg. the rate of disappearance of O it was found that (1) O absorption was initially very rapid even at room temp., and was followed by slow long-continued absorption; (2) the initial rapid absorption did not form H_2O, CO_2 or CO but the later slow absorption gave all 3 in amts. increasing with the temp.; and (3) the ratio CO_2:CO remained const. at any given temp. throughout absorption but decreased with increasing temp. Examn. of the occluded gases in artificially weathered coal showed that whereas some O was occluded at 15° which could be removed by phys. means, the greater part was retained and could be recovered only at higher temps. as CO and CO_2. By first drying air, more of its absorbed O was retained by the coal. The 1st step in the oxidation of coal is probably the formation of an addn. compd. or complex of O with some ingredient. To find a relation between chem. compn. and ignition temp., dried air was drawn through powdered coal surrounded by sand at const. temp. The temp. of the sand was then increased at a const. rate and the temps. of coal and sand were detd. Time-temp. curves gave the rate of rise of temp. of the sand and of the coal. At low temps. the sand and coal curves were parallel but at a definite temp. for each coal, they intersected. This temp. is defined as the *ignition temp. of coal* relative to other coals tested by the same method. Numerous tests gave ignition temps. of 165–200° for bituminous coals. The O content varied inversely with the ignition temp. *Self-heating* is mainly an attachment of O to mols. with high C, followed by chem. reactions of this O with other ingredients. Colored plates show the microscopic appearance of fusain (*A*), durain (*B*), clarain (*C*), and vitrain (*D*) before and after treatment with HNO_3 + HF. Proximate and ultimate analyses of *A, B, C* and *D*, the action of solvents and reagents, destructive distn. *in vacuo* and detn. of the gaseous and liquid products were made, detailed methods and results of which are reported. The % C, ash, C_5H_5N ext. sol. in

$CHCl_3$, $\alpha + \beta + \gamma$ compds. and ash sol. in HCl decreased and the O, H_2O, C_5H_5N ext., EtOH ext., β-compds. alc. KOH-sol., I absorption and ash sol. in H_2O increased in the order *A*, *B*, *C* and *D*. *D* is more colloidal than *A*, *B* or *C*, for no tissue structure could be detected under the highest power and its fracture was conchoidal. The ashes differed in compn., *B* contg. far more Al and Si and far less Ca, Mg, Na and H_2O-sol. than the others. The *D* ash contd. 70% sol. in H_2O. *B*, *C* and *D* contd. approx. the same % of γ compds. On dry distn. of *A*, *B*, *C* and *D*, CO_2 was the chief gas evolved below 300°. Beginning at 300° gaseous paraffins and from 400° up H was evolved in large amts. Except for CO_2, the amt. of each gas evolved over equal temp. ranges was greatest for *D* and least for *A*, the compn. being similar. The parallel vol.-temp. curves showed that the relative evolution of H and paraffins was approx. the same for *A*, *B*, *C* and *D* indicating that each contd. the same proportions of $\alpha + \beta$ compds. and γ compds. The amt. of CO_2 below 400° was greatest for *D* and least for *A* and above 400° the reverse *A* evolved CO_2 at a const. rate between 350° and 600°. By distn. on a large scale *D* had a decompn. point at 350–60° with rapid evolution of gas and oil, and *B* 370–80° With *D* all tar distd. below 460°, with *B* tar was still evolved at 480°. *D* gave less tar than *B*, the same amt. of residue and more H_2O and gas. The tar from *D* gave less pitch than *B*, and the same amt. of oils. The tar oils contd. a high % of phenols, and the neutral oils which were oxygenated contd. a small % of satd. hydrocarbons. No characteristic reaction of *B*, *C* or *D* was found, as might be expected if there were a fundamental difference in chem. compn. Analysis indicated for *C* a compn. $^1/_3$ the way from *D* to *B*. From *D* to *B* the susceptibility towards solvents and reagents and to dry distn. diminished in the ratio *D*:*C*:*B* = 1:0.9:0.7. It is assumed that *A*, *B*, *C* and *D* contain a reactive and an inert group of compds. The former is attacked by solvents and reagents and yields most of the gases and tars. The latter gives on dry distn. the CO_2 and neutral oils. The reactive group contains more O and less C than the inert. The compn. of the reactive group is the same for *B*, *C* and *D* but the proportions of reactive and inert groups differ. C. C. DAVIS

The artificial production of coal and the hydrogenation of coal and oil. J. I. GRAHAM AND H. G. SHATWELL. *Fuel* **2**, 54–7(1923).—A description of the past and new work of Bergius at the works of the Deutsche-Bergin A. G. at Mannheim (cf. *C. A.* **12**, 760; **14**, 2414, 2550; **15**, 307, 3390; **16**, 261), particularly in the *hydrogenation of heavy oils*. Coal requires approx. 15 hrs. to hydrogenate 60%. Superheating, temp. variations and coke formation have been overcome by suspending the coal ground to 20 mesh in a heavy oil. The N is transformed quant. to NH_3 and to NH_4 compds. and the S to H_2S. A plant hydrogenating 0.5 ton of coal per day is in process. Any coal contg. less than 85% C (calcd. on an ash-free basis) can be hydrogenated at 40–200 atm. pressure at 400° with production of satd. hydrocarbons of different b. ps. similar to petroleum distillates, with phenolic compds. contg. a large proportion of O originally present in the coal. The most favorable conditions for hydrogenation of coal and oil are 400° and pressures above 100 atm. Hydrogenation of coal contg. over 85% C has not been accomplished and no oil has been obtained from charcoal. The autoclaves for hydrogenating oils are now heated by passing N through heated coils and then through the space between the inner cylinder and the autoclave walls at a pressure equal to that of the oil and H. A temp. varying not over 5° is maintained for weeks. The N emerging is used to preheat the oil and H which are kept sep. until the cracking temp. is reached. Mexican oil with 6% boiling under 210° yields 42% oil boiling below 210°. The remaining higher fraction is retreated with H with conversion of 80% to low-boiling oil. "Still residues" yielded in %, gasoline 45, kerosene 25, fuel oil 27, loss 3, with no coke formation. The reactions are slightly endothermic. Fifty tons of oil are produced daily, Mexican, Persian and Burmese oils, and German lignite tars and shales being used. H. is prepd. by an intermittent process of reducing hematite to Fe and treating the Fe with steam. Hydrogenation is successful with H contg. 10% impurities. C. C. D.

Analyses of Czechoslovak coals. F. SCHULZ. *Rept. Fuel Tech. Inst. Czech Polytechnic Highschool in Prague for 1921*, 145(1922).—Tables are given for complete analyses of (*a*) subbituminous coals—xyloid lignites from S. Bohemia and S. Moravia, common brown coals from N. Bohemia, Tertiary bogheads, waxy coal, pitch coal, Cretaceous and Liassic coal and (*b*) black coals—splint, cherry, anthracite, and mineral charcoal. D. F. BROWN

Waxy coals and Tertiary boghead in Bohemia. F. SCHULZ. *Rept. Fuel Tech. Inst. Czech Polytechnic Highschool in Prague for 1921*, 130–2(1922).—Analyses of waxy coals mined in Bohemia are given. They are worked up into coal wax (brown-coal bitumen) by extn. with C_6H_6. In the lignite field of Falknov another bituminous lignite called boghead is mined. This is a very hard, compact and lustrous coal burning

with a long smoky flame and has a heat value of 9000 cal. Both of these coals have a high % of volatiles (70–83%). It is thought that the Tertiary boghead is a waxy coal which has been transformed by dynamochemical actions. The % of ext. sol. in C_6H_6 in this coal runs from 9.8 to 15.5% in the samples described while that in the waxy coal runs from 16.3 to 62.8% and the volatile matter in both coals free from ext. runs about the same (about 50–70%), showing that the conversion of the waxy coal into boghead rendered a large portion of the waxy substance insol. in C_6H_6 and this test, therefore, is not a true means of detn. of the wax content in boghead. D. F. BROWN

Analyses of Czechoslovak peats. F. SCHULZ AND J. GEBURA. *Rept. Fuel Tech. Inst. Czech Polytechnic Highschool in Prague for 1921*, 140(1922).—S is remarkably high probably because of reduction of sulfates by bacterial action. The waxy substance extd. with C_6H_6 was over 7%. D. F. BROWN

The peat industry in Bavaria. V. MORHART. Report to Verein Wasser u. Gaswirtschaft. *Wasser u. Gas* **13**, 358–62(1923).—The location, methods of mining, and methods of using Bavarian peat are described. MARTIN E. FLENTJE

The determination of the caking power of coal. THOMAS GRAY. *Fuel* **2**, 42–5 (1923).—A comparison of the button of coke (produced in the lab. detn. of the volatile matter) with the same product from a coke oven showed that (1) whereas good coking coals give swollen buttons, the degree of swelling is not a measure of the coking power; (2) the dull, sooty patches on the silvery surface of coke also appear on the buttons of good coking coals; and (3) coals giving a dark residue with little or no luster with a granular surface and with little or no swelling are of no value for coke manuf. No data could be gathered by the crucible method for predicting the caking power of a coal, and a modification of the Campredon sand test was developed. The original Campredon test was found objectionable because (1) the mass of the mixt., the rate of heating and the final temp. vary with the nature of the coal; (2) no standard of cohesion has been devised; (3) the type of sand has great influence; and (4) as the proportion of sand increases, the amt. of loose powder increases. The method adopted was based on that of Pollard (The Coals of So. Wales, *Mem. Geol. Survey* **1908**, 11), but a max. of 5% by wt. of inert powder was chosen, and the relative absence of powder was accepted as proof of cohesion provided the coke supported a 500-g. wt. No attention was paid to the fact that the mass could support greater wt. Coal (60 mesh) and Belgian sand (40–50 mesh) were used and the temp. in the crucible was 1000°. The max. ratio of sand to coal giving a coherent mass able to bear 500 g. with less than 5% by wt. of loose powder was adopted as the *caking index*. By checking results by this method with the quality obtained from the same coals on a large scale, it was found that with caking indices (1) below 8, the coke was a powder or in small fusible pieces; (2) 8–9, the particles were strongly fritted together, forming large compact pieces but without evidence of fusion; (3) 10–15, fused patches at the surface or complete fusion occurred and (4) 16–20, the coke was fused throughout its mass, the index depending upon the fusibility, hardness, uniformity and absence of soft spots. The index as predicted by large-scale oven tests could usually be predicted within 1 point and always within 2 points of the lab. crucible test. Comparative tests showed that coals with index of: (1) 11 or lower have no value for the manuf. of coke in the present type of oven; (2) 12–15 are useful for mixing with good coking coals but are useless without such admixt. and (3) 16 or higher can be made into serviceable metallurgical coke. A max. index of 35 was obtained with a Durham coal. Different grades of sand gave marked variations in the index, so a sand must be standardized against a known coal. C. C. DAVIS

The caking-power curves of coal. A. BARADAU AND F. V. TIDESWELL. *Fuel* **2**, 61–5(1923).—Exception is taken on theoretical grounds to all previous methods which use a mixt. of coal and inert material, including that of Gray (preceding abstract). A method is devised whereby the *crushing strengths of cokes* over the whole range of mixts. of coal and inert filler are detd. (cf. *C. A.* **16**, 3376). A mixt. of coal (60 mesh) and electrode C (60–90 mesh) in varying proportions was carbonized in a crucible at 900°, and the coke button was submitted to a crushing test in a special app. The latter was essentially a lever machine with a pivoted pestle and counterpoise exactly balanced, the coke being placed in an anvil below the pestle and wts. being added at the extremity of the lever arm until the coke was crushed. Numerical data on bituminous coals are given. Graphs show the caking power with varying ratios of coal and filler. Coals can be grouped in 2 classes: (1) those with a high initial coking strength, rapidly decreasing on addn. of filler and (2) those with a low initial coking strength, rising considerably on addn. of filler to a max., then decreasing gradually. No relation was found between the type of curve and the % volatile or the C_5H_5N-sol. Coals in class (1) had a higher % O than those in (2). C. C. DAVIS

The use of the bomb calorimeter. P. MAHLER. *Chaleur & industrie* **3**, 1794–6 (1922); *Fuel* **2**, 57.—Precautions necessary to obtain reliable results are explained. C. C. DAVIS

Fusibility of ash from coals of the United States. W. A. SELVIG AND A. C. FIELDNER. Bur. Mines, *Bull.* **209**, 91 pp.(1922).—A short description of app. and methods for measuring ash fusion-point temps., with data on nearly 2000 samples. H. L. O.

Chemistry of combustion in coal-fired furnaces. W. K. LEWIS. *Ind. Eng. Chem.* **15**, 502–3(1923).—The percentages of O_2, CO_2 and CO in gases drawn from different levels of the fuel bed of a coke-fired furnace are plotted. The curves show (1) that CO_2 is the initial product of interaction of O_2 with C and that CO is formed only by reduction of CO_2; (2) the limiting factor in rate of CO_2 formation is the speed of diffusion of O_2 through the inert gases around the C particle rather than rate of chemical combination, while the CO,concn. depends upon the rate of chem. reaction. Low O_2 and high CO contents of the gases leaving the fuel bed emphasize the necessity for the admission of a secondary air supply and its careful control. H. L. OLIN

Value of coke, anthracite, and bituminous coal for generating steam in a low-pressure cast-iron boiler. JOHN BLIZARD, JAMES NEIL AND F. C. HOUGHTEN. Bur. Mines, *Tech. Paper* **303**, 56 pp.(1922).—The purpose of the tests described aside from the principal aim implied in the title was to study heat losses and to det. change in efficiencies with change in methods of firing, in rate of evapn. and in kind of fuel burned. Runs of 6000 lbs. were made with the 3 fuels on a house boiler of 32.5 sq. ft. grate area at steaming rates of approx. 100, 80, 50, and 30 percent rated capacities, with the use of measuring devices of high accuracy. Thermal efficiencies fell with increase of steaming rate, the ranges being 79–66 percent with coke, 77–66 with anthracite and 69–65 with bituminous coal. The inferior results with the latter are accounted for by higher flue-gas temps. and by loss of heat carried by water vapors generated by combustion of H_2. H. L. OLIN

Heat required by cities. MORCH. *Wasser u. Gas* **13**, 442–7(1923).—Various means of waste heat utilization from steam and gas engines, electric and gas plants, etc., are discussed. MARTIN E. FLENTJE

Power alcohol from calcium carbide. I, II. REX FURNESS. *Chem. Age* (London) **8**, 280–1, 304–5(1923).—With cheap elec. power, alc. could be economically produced in England by the scheme: $CaC_2 \longrightarrow C_2H_2 \longrightarrow AcH \longrightarrow EtOH$. T. S. CARSWELL

Motor alcohol: its theory and use. J. P. FOSTER. *Sugar News* **2**, 521–6(1921); *Expt. Sta. Record* **47**, 189.—Alc. treated with ether which has been obtained from alc. by dehydration makes the best motor fuel. The action of corrosive compds. formed by the combustion of such a mixt. is a serious problem. F. has shown that the most suitable basic chemicals for neutralizing the corrosive acids in the mixt. are the amines, either primary, secondary, or tertiary. G. H.

Contribution to the study of a (French) national fuel. CHARLES BARON AND ALBERT VERLEY. *Compt. rend.* **176**, 452–4(1923).—Alc. of 98° can be obtained from 90° alc. by distn. from a mixt. of AcOK and cresol. A mixt. of 35% 98° alc. and 65% gasoline is homogeneous at 10°. T. S. CARSWELL

Engine experiments with oxidized oils. J. H. JAMES AND F. C. ZEISENHEIM. *Chem. Met. Eng.* **28**, 543–5(1923).—Engine expts. with a fuel made by the catalytic oxidation of kerosene and a fuel of similar character made by the oxidation of gas oil show that the oxidized kerosenes develop approx. the same power as ordinary kerosene, in spite of the fact that their thermal value is $^1/_8$ less. It is believed that there is a better "clean-up" in the combustion of these partly oxidized fuels, which accounts for their efficiency. These oxidized kerosenes show lower detonation tendencies than the straight hydrocarbon fuel. Similar expts. with lower-boiling oxidized fuels in an automobile engine gave results which show that the above results hold here as well. C. H. HERTY, JR.

Motor transport performance with varied fuel volatility. C. T. COLEMAN. *J. Soc. Automotive Engr.* **12**, 343–50(1923).—The same 4 fuels as were used in the Soc. of Autom. Eng. Coöperative Fuel Tests (cf. Gottschalk, also Carlson, *C. A.* **17**, 1546) were tested in the 237 Post Office trucks in Philadelphia and Pittsburg. The first fleet consumes about 1000 gal. of gasoline per day and the second about 700 gal. per day. Results show that very little difference in mileage per gal. was obtained between the 4 fuels used. Little or no trouble was experienced in operation except a slight difficulty in starting with the heavier fuel and the necessity of more throttling for proper idling. These tests were run under summer conditions. The crank case diln. increases with increase of the end point of the fuel. D. F. BROWN

Utilization of exhaust gases from motors. MICHEL ZACK. *Industrie chimique* **10**,

109–11(1923).—Z. proposes exhausting the gases at a pressure of 3 kg. (per cm.²) abs. under a boiler which they would leave at 170° to pass through a turbine where their expansion would be used for obtaining work and the water vapor would be removed as it condensed. The gas is finally sent to a special condenser for the *production of liquid* CO_2. The process (Fr. pat. 517,184; Eng. pat. 130,559) is discussed mathematically, the economies which it can effect being shown. A. PAPINEAU-COUTURE

Laws governing gaseous detonation. T. MIDGLEY, JR. AND R. JANEWAY. *J. Soc. Automotive Eng.* **12**, 367–73(1923).—The motion of the flame front in a closed cylinder is discussed and an equation derived contg. the pressure ahead of the flame front and the pressure to the rear of the flame front as the only variables. It is shown how to apply this formula for const. throttle and varying temp. of the entering charge, and for const. temp. and varying throttle opening and the compression ratio. - D. F. BROWN

The partial oxidation of methane in natural gas. R. T. ELWORTHY. *Trans. Roy. Soc. Canada* **16**, Sect. III, 93–104(1922).—Passage of natural gas (contg. 80% CH_4) and O over certain catalysts (magnetite, oxides of Fe, Cu, Ag, Th, Co, V, U, borosilicate glass, and Pt) gave traces of formaldehyde; this was also given in traces by passage of the gas and CO_2 over heated Cu and heated platinized asbestos. Oxidation by the silent elec. discharge in mixts. of the gas and O gave a viscous liquid contg. polymerized aldehydes and resins, MeOH, HCHO, and HCOOH, and was the only process tried of possible com. value. A. T. CAMERON

Formation of unsaturated hydrocarbons from natural gas. R. T. ELWORTHY. *Trans. Roy. Soc. Canada* **16**, Sect. III, 105–8(1922).—Gas contg. 80% CH_4 and 7% C_2H_6 was passed through a heated tube contg. as catalyst a mixt. of pumice, C black, and CuO (1:1:5) (the CuO being completely reduced above 500°). The amt. of unsatd. hydrocarbons formed was always small. The optimum temp. is about 800°. Ethylene formed is probably from C_2H_6. A. T. CAMERON

The specific heats and calorific values of gases. C. DE LA CONDAMINE. *Chaleur & Industrie* **3**, 1797–804(1922); *Fuel* **2**, 58.—The relations between sp. heat at a definite temp. and the mean sp. heat over a range of temp., between sp. heats at const. vol. and pressure, etc., are given. Extensive numerical data are added, with a diagram showing the total heat of most gases at any temp. and for any vol. of gas. C. C. DAVIS

The therm. ALLAN GREENWELL. *Fuel* **2**, 1–4(1923).—An outline of the principles involved in the measurement of gas by the thermal units which it contains. C. C. DAVIS

The thermoelectric gas producer. ERNESTO STASSANO. *Il forno elettrico* **3**, No. 2, 38 pp.(1922); *Rev. métal.* **20** (Extraits) 127–8(1923).—Two or three pairs or groups of 3 electrodes are embedded in the coke of an ordinary producer and connected to an a. c. circuit. When the mass of coke reaches the required temp. steam is injected at the base of the producer and water gas is formed regularly and continuously. The producer absorbs 400 kw. and has shown a thermal efficiency of 80%. All the C is converted to CO and all the O introduced into the producer comes from the H_2O, so that the gas is exceptionally rich. The sensible heat is higher than that of ordinary water gas. Such a producer can also be used for the production of lean gas which would have a sufficiently high sensible heat to eliminate heat exchangers of Martin and glass furnaces. With lean gas, 0.94 kw. hr. and 0.213 kg. of coal (84% C) will produce 1351 cal. at 1858° if the gas is burned at 1000° as it comes from the producer with 10% excess of cold air. With water gas, 1.82 kw. hr. and 0.320 kg. of coke will give 3164 cal. at 2070° if the gas is burned as it comes from the producer with 50% excess air. S. studies the advantages of applying this producer in connection with a glass furnace and with a steel-melting furnace. It could also be used for absorbing off-peak power, the gas thus produced being used at times when the system was overloaded. A. P.-C.

German gas plants. I. ANON. *Wasser u Gas* **13**, 184–6(1923).—The first of a series of articles describing modern German gas plants. The municipal plant at Buer is described. **II.** KOHBERT. *Ibid* 210–5.—Description of the municipal plant of Königsberg. MARTIN E. FLENTJE

Hot-blast slagging gas producers. A. DESSEMOND. *Rev. universelle mines* **14**, 1–14(1922); *Fuel* **124**, 248; cf. *C. A.* **17**, 626.—Hot-blast ash-fusion producers are in use at St. Étienne not only for colliery refuse contg. 60% ash, but for lignite, gas coal, anthracite and pure and impure coke. No poking of the fuel bed is necessary. The rate of gasification reaches 400 lbs. per ft.² per hr. (approx. 10 times the ordinary producer) and radiation and convection losses are greatly reduced. There is no loss from incomplete gasification and the heat lost in the fused slag is less than the loss in unburned C when the same fuel is burned under boilers. The heat zone is small and the gas issuing is relatively cool. No steam is needed but the air must be preheated to 800°.

To flux the ash, 0.8 its wt. of limestone is added. The ground slag can be used for cement. A small regulus of Fe, Si and P is obtained. C. C. DAVIS

Producer-gas and gas-producer practice. R. V. WHEELER. *Fuel* **2**, 15–21, 48–53, 72–7(1923).—The subject is treated on a phys. chem. basis under the following headings: chem. reactions in a gas-producer; action of air on C, the equil. $CO_2 + C \rightleftarrows 2CO$, action of CO_2 on C, action of steam on C, relative rates of the reactions in the producer, the ash-zone, combustion-zone, reaction-zone, distn.-zone and temp. distribution in the producer. C. C. DAVIS

A modern tar plant. W. J. HUFF. *Chem. Met. Eng.* **28**, 720–4(1923).—A description of the plant of the Am. Tar Products Co., Chicago. E. H.

The treatment and composition of lignite tars. I. The treatment of lignite producer tars. FRITZ FRANK. *Z. angew. Chem.* **36**, 141–7(1923).—Extensive research has been directed toward the tech. handling of lignite tars from gas producers. The usual distn. procedure is not recommended because of the presence of high percentages of water, mech. impurities and asphaltic products. The water is highly emulsified with the tar, flue dust being the emulsifying agent, and is only sepd. after complete removal of the mech. impurities. For this latter purpose, filtration, sedimentation and centrifuging processes were investigated. Analysis of the tar for water, benzene insol., and ash indicated the extent of the purification. Ordinary or suction filtration, with and without fuller's earth, and filter pressing were all unsatisfactory because they failed to destroy the emulsion or were too slow. A special "Frank" filter (design shown), in which a tar of 11.7% H_2O, 2.28% benzene insol., and 0.68% ash was pressed through felt and sawdust at 75–80°, yielded a tar of 0.09% benzene insol. and 0.03% ash. Centrifuging at 4000–6000 r. p. m. and at 60–85° yielded tars under 0.7% H_2O and 0.06% mech. impurities. After either of these treatments, the distn. is accomplished without difficulty, best under a high vacuum. The asphalt content, as measured by the sp. gr. which ranged from 1.010 to 1.076 at 15°, varied sufficiently to prevent the use of the same method of purification for all tars. Tars before and after purification were air blown for 24 hrs. at 60–70° and distd. The formation of phenols and asphaltic products during blowing was indicated. One purified tar distd. under a vacuum gave 9 fractions ranging in phenolic content from 33% in the 100–150° fraction to 12% in the 330–363° fraction. Steam-distd. tar gave 74.8% neutral oil, 18.5% phenols, 0.4% carboxylic acids, 3.2% bases and 3.1% lost. It is believed that direct distn. of the original tar can be accomplished with the aid of a dehydrating column in which the warm tar is treated with superheated steam. The pitch or coke obtained in this case contains such impurities as to be of little value. C. B. EDWARDS

The treatment and composition of lignite tars. II. Creosote oils from lignite tar. R. AVENARIUS. *Z. angew. Chem.* **36**, 165–8(1923).—The distillate and the pitch residue from a steam-distd. lignite tar were examd. with a view to identifying the phenols and the carboxylic acids. The acids and phenols were each sepd. in the usual manner. Direct titration of the fractionated acids (distd. at 12 mm.) with KOH did not yield an end point sufficiently accurate for equiv. wt. calcn. The Me esters of the pitch acids were repeatedly distd. at 13 mm. pressure into fractions of 10° boiling range. The fractions were each submitted to elementary analysis, which indicated the following esters: $C_7H_{13}COOMe$, b. 206–216°; $C_7H_{13}COOMe$, b. 216–226°; $C_7H_{11}COOMe$, b. 246–250°; $C_8H_{15}COOMe$, b_{15} 143–153°; and $C_8H_{13}COOMe$, b_{11} 173–184°. The C content increases and the H decreases with rise in boiling temp. The acids of the lower fractions correspond to the formula $C_nH_{2n-2}O_2$, those of the higher fractions to the formula $C_nH_{2n-4}O_2$. According to their action with Br, they are of cyclic character. It was not found possible to sep. individual phenols by repeated fractional distn. at 12 mm. pressure. Sepn. was accomplished, however, by transforming the highly fractionated phenols into esters of carbamic and allophanic acids by treatment with urea chloride. These esters were purified by fractional crystn. from benzene, petroleum ether and MeOH. Analyses of the carbamates and allophanates indicated that *m*-cresol, 1,4,5-xylenol, C_8H_9OH, $C_9H_{11}OH$, $C_{10}H_{13}OH$ and unidentified thiophenols and unsatd. phenols are all present in lignite creosote oil. Known esters as follows were prepd.: phenol, *o*-, *m*-, and *p*-cresol, 1,3,4-, 1,4,5-, and 1,2,4-xylenol, and pseudocumenol esters of carbamic acid; also the phenol, *p*-cresol, 1,3,4-, 1,4,5-, and 1,2,4-xylenol, and pseudocumenol esters of allophanic acid. From a comparison of the properties of these known esters with the esters obtained from the creosote oil fractions, it was further established that tar phenols are constituted in part of *m*-cresol and 1,4,5-xylenol. The aromatic esters of carbamic and allophanic acids, unlike the corresponding aliphatic esters, could not be distd. at reduced pressure, being decompd. at temp. close to their m. ps. Cf. preceding abstr. C. B. EDWARDS

Benzene recovery from coke ovens. T. WESTHORPE. *Chem. Trade J.* **72,** 385–6 (1923).—A somewhat detailed account of plant practice, including a discussion of tower scrubbers, debenzeneizing and light oil stills, and washing and rectification processes. For max. benzene recovery the governing factors are: scrubbing capacity (15 cu. ft. per ton of coal carbonized per day is recommended), arrangement of packing (wooden grid type) (quality and quantity of wash oil (creosote oil, Scottish blast furnace oil, Am. gas oil), temps. of gas and oil (not over 25°), and limited gas velocity. Wash oil specifications are: water-free, b. p. 220–400°, with no solids boiling above 300°, freedom from suspensions, and low viscosity. Also in *Gas World* **78,** No. 2020 (Coking Sect.) 13–7.
C. B. EDWARDS

New process of quenching coke with utilization of the recovered heat for the generation of steam. PIERRE DIBOS. *Rev. métal.* **20,** 160–4(1923).—In the Sulzer quenching process neutral gas is circulated in a closed cycle over the hot coke and through a boiler. Results of operations at the Zurich gas plant during 1921 (285 working days) showed a thermal efficiency of 78.66%. The circulating fan absorbed 8% of the steam generated.
A. PAPINEAU-COUTURE

The determination of the specific gravity of coke. W. A. SELVIG AND W. L. PARKER. *Chem. Met. Eng.* **28,** 547–50(1923).—The porosity of coke is calcd. from the true and apparent sp. gr. of the coke. Complete tests are given on methods for detg. these gravities on large and small samples of coke and a sample of 20 to 30 lbs. of large pieces of coke is recommended.
C. H. HERTY, JR.

Fuel economy in coke production. M. CARETTE. *Rev. ind. minérale* **1,** 523–6 (1922); *Fuel* **124,** 247.—A description of a method used at the Zürich gas works for recovering the sensible heat of hot coke. A continuous cooling vessel is used, hot coke being charged at the top and cold coke withdrawn at the bottom. Inert gas is circulated continuously up through the coke and down among the pipes of a H_2O-tube boiler. Each ton of coke at 1050° has approx. 388,500 available cals., of which 92,500 are lost, since the coke is discharged at 250°, but 78% is recovered as steam and 8% of this is required to operate the blower. A dry coke is produced and approx. 400 lbs. of steam are generated per ton of coke.
C. C. DAVIS

Dissociation of gases (SCHELEST) **2.** Quantity of helium and other gases in Japanese natural gases (YAMADA) **8.**

Air filter for internal-combustion engines. A. R. DRESSLER. U. S. 1,451,329, Apr. 10.

Gas from oil shale. S. MARKO. U. S. 1,451,367, Apr. 10. Ground shale is agitated in the presence of dry heated combustion gases at a temp. above 315° and the heated shale and gases are passed to a secondary heating zone where the material is more highly heated and treated with superheated steam to promote the enrichment of the gas formed in hydrocarbons.

Expansion and absorption of gas and vapor from oil wells, or other gases. J. C. BERTSCH. U. S. 1,452,061, Apr. 17. A gas and liquid, *e. g.*, natural oil well gas and absorbent are mixed and put under pressure and the gas is permitted to expand in vertical pipes through which the associated liquid is simultaneously elevated and satd. with the vapor from the gas. The expanded gas is mechanically sepd. from the satd. liquid and the vapor is sepd. by heat and liquefied. The denuded liquid is cooled and reused for further satn. with gas.

Gas producer. H. A. DREFFEIN. U. S. 1,451,011, Apr. 10. Valves are provided for controlling the flow of gas from and steam to the generator while preventing explosive mixts. accumulating in the control app. (which includes a gasometer).

22—PETROLEUM, ASPHALT AND WOOD PRODUCTS

F. M. ROGERS

High-grade gasoline content of Tonkawa crude. ANON. *Nat. Petroleum News* **15,** No. 13, 72(1923).—Four samples of this crude gave on analysis 13–15.4% of light gasoline boiling below 212° F. The total gasoline and naphtha content varies from 39.6 to 43.2%.
D. F. BROWN

Expander absorption process for saving gasoline in still gases. J. C. BERTSCH. *Nat. Petroleum News* **15,** No. 13, 35–41(1923).—Small units consisting of a series of S scrubbers are arranged in series with a blending equipment so that the gas from a battery

of stills passes counter-current therein through a lye soln. in the scrubbers, thence through a rotary compressor in which the vapors are thoroughly mixed with the absorbing oil (either naptha for blending or distillate to be used for cracking). The vapors are then forced through a series of blending columns each 26 ft. high counter-current to the absorbing oil. An installation of a small unit of this sort for each battery of stills is superior to a single large unit. D. F. BROWN

Cracking processes and their use for obtaining motor fuel. H. ECKART. *Petroleum Z.* **19**, 223–5(1923).—A review. Cracking processes are classified as (1) pressure distn. (Burton and Coast processes), (2) cracking in tubes (Greenstreet, Hall and Rittman processes), (3) use of catalyzing agents (McAfee process), (4) combinations of the above (Dubbs, Jenkins and Bacon processes), (5) miscellaneous processes (Cherry, Coast, Ellis processes). Another system of classification for processes related to obtaining low-boiling product from high-boiling products would be (1) thermal decompn., (2) reduction and hydrogenation. D. F. BROWN

Coast cracking process to be continuous with new improvement. J. C. CHATFIELD. *Nat. Petroleum News* **15**, No. 14, 53–6(1923).—A brief description of the process is given. A carbon remover consisting of a series of scrapers which move slowly over the surface of the still from front to rear pushing the C ahead of the scrapers to the rear of the still where it is deposited beyond the fire wall enables the process to run continuously instead of on the 60-hour cycle. Of the gas oil charged about 70% goes over as pressure distillate, 26% remains as fuel oil and the rest is loss. A sample yield is given as 56° Bé. gasoline, 450° F. end point 42%; 42° Bé. kerosene water white 5%; 22° Bé. fuel oil 47%; loss 6%, calcd. on the gas oil charged. D. F. BROWN

Crude-oil distillation. CROSS-WIDDELL ENGINEERING CO. *Petroleum Age* **11**, No. 7, 21(1923).—The relative efficiencies of the batch, continuous and tube stills are compared. D. F. BROWN

Analyses of Czechoslovak crude oils. F. SCHULZ. *Rept. Fuel Tech. Inst. Czech. Polytechnic Highschool in Prague for 1921*, 101–2(1922).—These are Miocene and Eocene oils. The Miocene oils of Gbely and Hodonin belong to the type of Louisiana crudes from St. Martin Parish and Calcasieu Parish. The first fraction of these crudes distg. between 150° and 250° has a terpene-like odor, is easily volatile with satd. steam at 100°, but contains no true terpenes since neither Br, concd. HNO_3, nitrosulfuric acid nor dry HCl acts upon it. Vigorous shaking with an equal vol. of fuming H_2SO_4 showed a loss of only 2% and heating this mixt. on the water bath for several hrs. showed a decompn. and transformation into asphalt of only 8%. This treatment did not destroy the terpene-like odor. The crude of Gbely contains no trace of paraffin. The amt. of soft asphalt insol. in alc.-ether mixt. is 0.27%, S 0.25%. Hodonin crude is free from asphalt. The Eocene crudes of Bohuslavice, Turzovka and Mikovd correspond to Penna. paraffin base crudes, yielding a high % of gasoline and kerosene (50–86%) and leaving a transparent petrolatum, free from asphalt and melting at 26–28°. Paraffin varies from 2.5 to 8% and S is below 0.03%. The only pool commercially productive as yet is that of Gbely. D. F. BROWN

Results of cracking Panuco topped crude by the Dubbs process. G. EGLOFF. *Nat. Petroleum News* **15**, No. 12, 35–7(1923).—The principles of the process are summarized and the app. is briefly described. From 1012.5 bbls. of Panuco crude of 9.7° Bé. gravity the following was obtained, cracked distillate 51.3° Bé. 26.3%, cracked residuum 8.2° Bé. 66.4%, uncondensable gas 140,725 cu. ft., coke 10.9 tons (6.18% by wt.) and fuel consumed 4.47% of charge, gasoline (Navy specification) 21.1%. The cracked residuum blended with gas oil bottoms from the cracked distillate gave a fuel oil of Furol viscosity 186 sec. at 122° F. The gasoline produced by the process was acid; caustic soda and plumbite treatment gave a water-white product passing all specifications. D. F. BROWN

Bruin cracking process. P. TRUESDELL. *Nat. Petroleum News* **15**, No. 11, 51–2(1923).—This is a batch process carried out in a shell still using pressure on the still but releasing it before the vapors enter the condenser. It appears to be less efficient on fuel oil than on light gas oil. The yield from light Penna. gas oil is about 35–40% gasoline. D. F. BROWN

Comparison of principles involved in existing cracking processes. L. REISS AND E. R. LEDERER. *Petroleum Times* **9**, 483–4, 541–2(1923).—See *C. A.* **17**, 872. D. F. B.

Modern refining methods. W. MILLER. *Oil Gas J.* **21**, No. 45, 16, 113–5(1923).—The methods of refining petroleum to its various finished products as carried out by the Marland Refining Co. plants are described. D. F. BROWN

Petroleum refining industry in Mexico. J. PORTILLO Y WEBER LOPEZ. *Mem. rev. soc. cient. Antonio Alzate* **42**, 33–112(1923).—A very detailed and comprehensive

presentation contg. many tables of economic and physical chem. data and a great deal of sp. information concerning the operations of the competitors in the field.
O. B. HELFRICH

Refinery problems affecting motor-fuel supplies. F. A. HOWARD AND N. E. LOOMIS. *Ind. Eng. Chem.* **15**, 482–3(1923).—Methods for conserving, during refining and storing, of the highly volatile fractions of crude petroleum and of the naphtha cuts, are enumerated and discussed briefly. "*Sealite*," an aq. soln. of glucose, corn starch, glycerol, glue, and $CaCl_2$, beaten in air until the emulsion weighs about 4.75 lbs. per gal., decreases by 80% the evapn. from weather-tight tankage. A layer 1 in. thick of "Sealite" floats on the surface of the naphtha or crude petroleum. W. F. FARAGHER

Petroleum of Montechino-Velleia. MASSIMO FENOGLIO. *Giorn. chim. ind. applicata* **4**, 565–70(1922).—The article gives an outline of the geological conditions of the oil-bearing strata of the Montechino-Velleia region, a review of the known physical and chem. data upon the oil, and an enumeration of the physical properties of a sample of crude oil taken from the reservoir of the Fiorenzuola refinery. R. S. P.

Determination of water in mineral oils. LUIGI LOSANA. *Giorn. chim. ind. applicata* **4**, 570–3(1922).—H_2O in mineral oils can be estd. rapidly and with sufficient accuracy for technical uses by the action of Na amalgam or metallic Ca upon the H_2O. The H produced is measured volumetrically for low content of H_2O. For high amts. of H_2O, the amt. present may be calcd. from the increase in pressure of the H produced in a closed vessel. ROBERT S. POSMONTIER

Roumanian petroleums. EDMOND SCHMITZ. *Mat. grasses* **14**, 6214–9, 6236–8, 6264–5, 6295–7, 6324–6(1922); **15**, 6386–7(1923).—A large no. of analyses are given.
A. PAPINEAU-COUTURE

Madagascar petroleums. I. Geological formation and occurrence. ANTOINE MERLE. *Mat. grasses* **14**, 6208–13(1922); cf. *C. A.* **16**, 4332. **III. Madagascar bitumen.** H. GAULT, L. BOISSELET AND M. PFERSCH. *Ibid* 6257.—Another sample of asphalt, taken and shipped under proper conditions, gave: bitumen 98.50%, calorific value 9,525 cal., H_2O (on distn.) 6.32, crude oil 69.60, coke 16.10, gas and loss 7.98%, ash 0.65, fixed C (by difference) 15.45%, d_{15} of crude oil 0.899. Bituminous sands gave (av. of 3 samples): bitumen 9.52%, calorific value 1,131 cal., water (on distn.) 1.11, crude oil 6.38, coke 90.55, gas and loss 1.96, ash 88.40, fixed C (by difference) 2.15%, sp. gr. of crude oil 0.896. A. PAPINEAU-COUTURE

The history of the petroleum of the Persian Gulf. I. WINKLEHNER. *Oil Eng. Finance* **3**, 283–5(1923). D. F. BROWN

Distribution of sulfur in petroleum products. GUSTAV EGLOFF AND J. C. MORRELL. *Chem. Met. Eng.* **28**, 633–5(1923).—Mexican gas oil was cracked at a pressure of 120 lbs. gage in a Dubbs pressure still of commercial size, the temp. of the oil and oil vapor leaving the heating coil averaging 800° F. Percentages of S in the gas oil and in each of the primary products were detd. by the HNO_3 (Rothe), Na_2O_2-bomb, and O-bomb methods. S in the pressure distillate was detd. by the lamp method (1.40%). The gas oil had the following properties: sp. gr., 0.8973; initial b. p., 363° F.; 90% over point, 710° F.; flash point, 210° F.; fire test, 240° F. (Cleveland open cup); Saybolt Universal viscosity at 100° F., 50 sec.; % of S, 2.19 by HNO_3 method, 3.11 by Na_2O_2-bomb method and 2.90 by O-bomb method. The % by vol. of H_2S in the gas as detd. by absorption in *N* $CdCl_2$ soln. was 6.8. The distribution of S in the primary products was as follows, according to the O-bomb detns.: coke, 2.01%; residuum, 62.08%; pressure distillate, 23.05%; gas, 12.90%. The pressure distillate was approx. 50% by vol., based on the gas oil cracked and the vol. of gas (standard conditions) produced was 188 cu. ft. per bbl. of gas oil used. Complete tables of analysis are included. The errors of analysis as well as those of the meters, gages and scales used are included in the final figures. The distribution of S in the products suggests that of N in the destructive distn. of oil shale.
W. F. FARAGHER

The processes of adsorption in the oil-bearing strata. M. A. RAKUZIN. *Bull. acad. sci. Russie* **1919**, 1143–54.—A theoretical consideration of the adsorption properties of different adsorbents, supplemented by the results of a few lab. expts. and by analytical data. All amorphous, porous materials serve equally as adsorbents for colloidal, non-electrolytic, bituminous and analogous substances. This adsorption process is non-reversible and the adsorbed substance cannot be extd. by ordinary solvents. Asphaltous, asphaltic and bituminous rocks from which the bitumens can be extd. by solvents represent simply mineralized bitumens. In cases where the oil appears at the surface in different degrees of color and asphaltic content, it had to pass through strata of amorphous substances, where adsorption processes took place. In such cases there is no reason to import com. adsorbents, as the substance of the oil-bearing strata

can give after a due calcination an adsorbing material of quite sufficient properties. Such adsorbents as fuller's earth and hydrated alumina are indispensable in only those cases where polymerization or disintegration phenomena are of a special benefit.
M. G. KORSUNSKY

Oil-shale companies should manufacture carbon black. J. T. SMITH. *Railroad Red Book* **40**, 441(1923).—Recent tests show that after the oil has been distd. the shale residue yields a C black or substance similar to it, which can be recovered by flotation methods in which the shale oil is the flotation medium. D. F. BROWN

Oil shale. D. T. DAY. *Oil Eng. & Finance* **3**, 383–4(1923).—Complete extn. of the oil in Monterey (Cal.) shale is possible in a Soxhlet app. with CCl_4 as the solvent. The product after evapn. of the solvent was a thick asphaltic material similar to the oil obtained from wells drilled into the crevices of the diatomaceous earth in this region. The pores of the diatomaceous earth in this locality are coarser than those in most shales and it is suggested that the extent to which oils in shales will yield to solvent action depends upon the proportional coarseness of the absorbing material in the shale.
D. F. BROWN

Geology and producing conditions of the Kevin-Sunburst oil field (Montana). F. R. CLARK. *Nat. Petroleum News* **15**, No. 15, 55–61(1923).—The geological features and structure of this region are described in detail as well as the grade of oil. Analysis of oil from 3 wells in this region gave, resp., S 1.04, 1.65, —; Bé. gravity 35, 30, 31.7; gasoline and naphtha approx. 30.9, 2.3, 25%; kerosene 18.4, 19.4, 15%; gas oil 10 2. 16.5, 20%; wax distillate —, —, 25%; residue 10.5, 9.4, 15%; light lubricants 6.4. 8.1, —; medium lubricants 5.9, 15.3, —; viscous lubricants 5.4, —, —.
D. F. BROWN

Sulfur compounds giving positive doctor test found to be harmless. J. C. CHATFIELD. *Nat. Petroleum News* **15**, No. 11, 133(1923).—Sulfur compds. in gasoline which produce a positive doctor test have no action on metals and are not injurious to auto equipment. The free S added in the doctor treatment, if not removed in subsequent refining processes, may cause corrosion of automobile parts. D. F. B.

Methods of determining the asphalt content of crude oils. O. HANUS. *Rept. Fuel Tech. Inst. Czech. Polytechnic Highschool in Prague for 1921*, 91–3(1922).—Results are given for asphalt detns. in the normal type of Boryslaw crude oil (sp. gr. 0.864) with gasoline, ethyl alc. and ether, amyl alc. and ethyl alc., ethyl acetate, aq. butanone, and ether-acetone as pptn. agents. The highest values in asphalt free from ceresin-like substance were obtained by pptg. the crude oil with a mixt. of ether and glacial acetic acid. A description of this latter method is given. The asphalt obtained directly by pptn. when heated to 100° softened without becoming fluid; after extn. with alc. the remaining asphalt proper was hard and brittle and showed a m. p. above 100°.
D. F. BROWN

Asphaltic substance in gas-producer tars from lignite. J. MZOUREK. *Rept. Fuel Tech. Inst. Czech. Polytechnic Highschool in Prague for 1921*, 119–21(1922).—Two kg. brown-coal tar was sepd. by means of an equal vol. of light gasoline (0.690) into (1) an oily portion sol. in gasoline and almost free from asphalt, and (2) the insol. asphalt forming a hard and brittle substance with conchoidal fracture. Comparison of the properties of these 2 components shows that the high solidification point of the tar is due to the presence of the asphaltic substance. Removal of the asphalt lowered the pour test from 38° to 30.5°, viscosity from 2.6 at 100° to 5.8 at 50° and the sp. gr. from 1.029 to 0.920. "Resignols" (unknown phenols which in alk. soln. most readily absorb O_2 from the air and after solidification of the oxidized soln. are pptd. as black resins, non-volatile with steam) are formed by cracking of this asphaltic substance.
D. F. BROWN

Occurrence of asphalt at Strecno (Slovakia). J. J. JAHN. *Petroleum Z.* **19**, 219–20(1923).—There are large deposits of dolomite rock contg. asphalt. Analysis of the rock shows water 0.80%, bitumen 6.00%, and rock 93.2%. The asphalt m. 48°, b. 165° and distils over 8% up to 200°, 2% between 201° and 250°, 4% between 251° and 300°, and 38% between 301° and 350°. Tar residue 40%, and loss 8%. The 38% fraction solidifies at room temp. D. F. BROWN

The technic of wood distillation. B. WAESER. *Metallbörse* **1**, 21(1922); *Fuel* **2**, 97.—A summary of the present status of the German wood distn. industry. The distn. of birch under practical conditions is expressed as: $2C_{42}H_{64}O_{28}$ (wood) $\longrightarrow$ $3C_{15}H_{10}O_2$ (charcoal) + $5CO_2$ + $3CO$ + $2MeCO_2H$ + $MeOH$ + $C_{22}H_{20}O_4$ (tar) + $28H_2O$. Up to 400° in a high vacuum: $2C_{42}H_{64}O_{28}$ + $4C_7H_4O$ + (charcoal) + $19H_2O$ + $3CO_2$ + $2.5MeCO_2H$ + HCO_2H + $MeOH$ + $C_{20}H_{30}O_{15}$ (pitch). On heating 14 days at 400° the pitch is decompd.: $C_{30}H_{30}O_{15}$ $\longrightarrow$ $4C_7H_4O$ + $7H_2O$ + $2CO_2$. C. C. D.

A new method of saccharification of wood. ERICK HÄGGLUND. *Svensk Kem. Tids.* **35**, 2-24(1923).—Coniferous wood shavings are treated at room temp. in earthenware diffusion batteries with 40% HCl. The max. yield of sugar (21.6% of the wt. of the wood dried to 1% moisture) is reached in 72 hrs. In 24 hrs. there is an 18% yield. At 40° for 8 hrs. the yield is 23.5%, but no higher yield than this could be obtained. The amt. of sugar produced increases, with the vol. of HCl used, from 1 to 7 vols. For 3 vols. it is doubled and for 6 trebled. The yield per unit wt. of HCl is better for the lesser vols. Seventy-six % of the wood is recovered as a 30% sugar soln. This soln. contains pentose, glucose, and isomaltose. The pentose may amount to 12–23% of the sugars. There is a direct relation between the amt. of sugar formed and the HCl adsorbed. The uses of sugar for fodder and for industrial alc. are referred to. As by-products there are: 1% of the wt. of the wood as MeOH, 2% as AcOH, and 30% lignin. The lignin can readily be dried to a moisture content of 12% and made into briquets which compare favorably with briquets from coal dust and peat. Comparisons with sugar from sulfite wastes are made. Practical aspects of sugar concn. and recovery of acid are discussed. Three pages are devoted to economics and development. A. R. ROSE

BUNBURY, H. M.: **Destructive Distillation of Wood.** London: Benn Bros. Ltd. 320 pp. 35s.

Hydrogenation of coal and oil (GRAHAM, SHATWELL) **21.** Gas from oil shale (U. S. pat. 1,451,367) **21.** Segregating olefins (U. S. pat. 1,452,322) **10.**

Hydrogenating unsaturated hydrocarbons. H. ROSTIN. U. S. 1,451,052, Apr. 10. Petroleum oil distillates or other unsatd. hydrocarbon material to be hydrogenated is vaporized and the vapors are treated with H_2S at a temp. of about 300° or higher in the presence of Cu or other metal which will liberate H from the H_2S at this temp. to effect hydrogenation.

Distilling petroleum oil. J. W. VAN DYKE. U. S. 1,451,129, Apr. 10. Oil to be distd., *e. g.*, petroleum, is heated in a still into the lower portion of which steam is injected through a perforated pipe. The mixt. of steam and oil vapors is led off through condensing pipes and steam sepd. from the mixt. in the condensing system is fed back through an injector with fresh steam into the still.

Petroleum oil distilling plant. C. F. HILLMAN. U. S. 1,451,574, Apr. 10. A pipe line connects a pipe still with one of a pair of separators from which a vapor line extends to the other separator. A pump delivers oil to the pipe still and portions of the pump line enclose portions of the vapor line. Oil from the separators is fed by gravity to a pair of stills which are connected with a pair of condensers. A pipe line also connects a second pair of stills with the first separator so that oil will flow into the stills by gravity and a pumping-out line is connected with the bottoms of the stills. Valved discharge lines are provided and by-pass pipes and heat interchange connections are arranged to control the app.

Oil-shale distilling apparatus. G. E. HOLMES. U. S. 1,451,575, Apr. 10. A closed horizontal retort extends through a furnace so that it is subjected to a graduated external heat. Shale is admitted to the cooler end of the retort and an agitating and conveying device moves the shale along within the retort. Vaporized products are withdrawn from different outlets along the retort and low pressure steam is introduced into the lower portion of the retort during the distn.

Apparatus for refining crude petroleum. J. MAYES. U. S. 1,451,739, Apr. 17. An evapg. chamber is supported above the fire-box of a furnace and is provided with U-shaped baffles arranged in series to cause oil to take a tortuous path through the chamber. A vapor outlet pipe extends from a dome over the evapg. chamber and several of these chambers may be arranged in succession.

Apparatus for dehydrating petroleum emulsions. W. MEREDITH. U. S. 1,452,207, Apr. 17. The emulsion is forced by a propeller in contact with a rotating electrode between plates which guide the flow of the emulsion.

Condenser for casing-head gasoline or other gases. F. E. VOORHIES. U. S. 1,451,190, Apr. 10. Independent condensers of low and high efficiency are used together, the gas being passed successively to them.

Asphaltic compositions. G. MONRATH. U. S. 1,452,309, Apr. 17. Pipes, pipe linings or similar asphaltic structures are formed with an asphalt compn. which contains petrolene about 20–30%, asphaltene about 50–70% and carbenes about 10–20%.

This material will withstand relatively high temps. without softening as much as ordinary asphaltic compns. U. S. 1,452,310 relates to similar compns.

23—CELLULOSE AND PAPER

CARLETON E. CURRAN

Solvents of some cellulose esters. E. W. J. MARDLES. *J. Soc. Chem. Ind.* **42**, 127–36T(1923).—A study of the solvents of cellulose acetate, cellulose nitrate, and $(C_{12}H_{13}O_8Cl_3)_x$ indicates that the solvent action of a liquid depends on the sp. character of the liquid and on the ester. Hydrocarbons and ethers exert little or no solvent action, while MeOAc, BzOH, and acetone are excellent solvents. There is a rapid decrease in solvent power with the ascent in any homologous series. With the introduction of Cl into the mol. there is a large increase in solvent power, but with the accumulation of Cl there is a subsequent diminution. Thus $CHCl_3$ is a better solvent than CCl_4. Graphical representation is also given of the solvent power of a number of binary systems such as acetone and C_6H_6, also of ternary systems such as acetone, C_6H_6, and C_6H_5OH. C. T. WHITE

Hydrocellulose. A summary of the literature. P. H. CLIFFORD. *J. Textile Inst.* **14**, 69–77(1923).—Hydrocellulose can be prepd. by the immersion of cotton in concd. HCl or H_2SO_4 at 15° for 12–24 hrs. Moist gaseous HCl or HBr transforms cellulose into hydrocellulose in a much shorter time. It can also be prepd. by the action of org. acids such as oxalic and tartaric at 100° on cotton. Hydrocellulose is a friable, sandy powder, generally white in color. It remains unchanged when heated at 100°. It has reducing properties, and can be either esterified or methylated. C. T. WHITE

Quantitative composition of coniferous woods. A. C. VON EULER. *Cellulosechemie* **4**, 1–11(1923).—Earlier analyses of wood have not taken into consideration the distribution of lignin-like substances and E. has therefore made a critical study of the analysis of wood with special reference to the lignin detn. Actual woody tissue is assumed to include: cellular carbohydrates insol. in H_2O, encrusting materials (lignin), certain lignin-like tannins which may be present in solid soln. (?) in the cell wall, natural dyes which are firmly held in the cell wall and which are also related to lignin and alcohol-sol. resins, which form an integral part of woody tissue, since they are structually related to lignin, and which are to be reckoned as lignin substances. The following components are not included in the wood substance and due correction must be made for them in computing analyses: ash, fats, proteins and benzene-sol. oleoresins. E. made a critical study of the analysis of conifer resins of Norway spruce and Scotch pine, finding that the relative amts. of alc. and benzene extractives vary considerably depending on the age of wood and conditions of growth. In the lignin detn. E. recommends that the following corrections be made if lignin is detd. by Becker's 72% H_2SO_4 method: To correct for AcOH split off from the lignin, the % of lignin must be increased by 2%. (E. refers to % lignin found by weighing the crude lignin residue and dividing this wt. by the bone-dry wt. (× 100) of "woody tissue" as defined above.) A further correction of —5.7% is made to account for H_2SO_4, which cannot be removed from lignin by washing. To the resulting figure is added the % of alc. extractives (found after the wood has been previously extd. with benzene). As an example: Analysis of Norway spruce yielded 3.53% alc.-sol. resins (*a*), the lignin detn. by H_2SO_4 indicated 30.5% (*b*). Then the true (or "rational") % *lignin* = $a + b - 3.7 = 30.3$. In general the rational % of lignin is not far removed from the empirical % lignin as ordinarily detd. An average of analysis of 9 coniferous woods was found to be 28.4% lignin, individual results ranging from 26.8 to 31.4%. Taken collectively the results are not strikingly different from those obtained by Klason. L. E. WISE

East African bamboo as a paper making material. ANON. *Bull. Imp. Inst.* **20**, 458–61(1922).—Bamboo (*Arundinaria alpina*) from Kenya colony had the following compn.: H_2O 9.5, water-sol. material 3.6, cellulose (in material as received) 47.5 (= 52.5 on dry basis), ash 1.2%. Length of ultimate fibers 1.6–2.7 mm., mostly 2.0–2.6 mm., av. 2.3 mm. Cooking on a lab. scale for 7 hrs. at 160° with 16 parts of NaOH (on the wt. of raw materials) as a 4% soln. gave 40% of a pulp which was not completely broken up in the beater and could not be satisfactorily bleached. Using 20 parts of NaOH under the same conditions gave 34% of a pulp of good felting qualities which could be readily broken up and furnished a pale brown paper of good strength. The pulp bleached readily (bleach consumption equal to that of soda wood pulp) (31% yield on the raw material) giving a white paper of good quality. About 1.5 tons of bamboos were heated

for 12 hrs. with an extra strong NaOH soln. (strength not stated), without removing the nodes, and furnished a pulp which bleached satisfactorily and yielded white paper of good quality. The yield of sized and loaded paper was 41.23% on the wt. of bamboo. The paper was somewhat soft but could have been improved by longer beating. Better results would be obtained by selecting the stems and keeping those of different ages sep. from one another. A. P.-C.

The relationship of cotton to water and steam (FARGHER, WILLIAMS) **25.**

Elastic masses from nitrocellulose. A. RITSCHKE. Can. 229,857, Mar. 27, 1923. A fabric base has pressed on each side a skin formed of a mixt. of nitrocellulose with a non-volatile gelatinizing substance.

Flexible compositions of nitrocellulose. A. RITSCHKE. Can. 229,843, Mar. 27, 1923. Non-inflammable compns. for driving belts, linoleum, etc., consist of nitrocellulose and liquid triaryl esters of phosphoric or thiophosphoric acid.

Fireproofing cellulose ester films. A. ARENT. U. S. 1,451,313, Apr. 10. An Sb salt which is capable of rendering cellulose nitrate or similar films non-inflammable, *e. g.*, $SbCl_3$ in AcOEt, is treated with Hg to remove free HCl and applied in soln. to films.

Waterproofing cellulose. F. MOELLER. Can. 229,826, Mar. 27, 1923. Cellulose is rendered waterproof by treating it with a chloride of S. Cf. *C. A.* **17,** 189.

Paper pulp. B. S. SUMMERS. U. S. 1,451,125, Apr. 10. Paper pulp is prepd. by cooking wood in a soln. contg. a bisulfite together with $Na_2S_2O_4$ or Zn or Mg or other material capable of producing $H_2S_2O_4$, which facilitates obtainment of high yields of pulp.

Waxing and sizing composition for paper. F. L. PULLEN. U. S. 1,452,389, Apr. 17. A liquid for sizing paper is formed of lime water, borax, beeswax and linseed oil.

Apparatus for the recovery of paper stock from mixed rubbish. B. M. BAXTER. U. S. 1,451,522, Apr. 10. The app. comprises a perforated drum rotatably mounted in a tank.

24—EXPLOSIVES AND EXPLOSIONS

CHARLES E. MUNROE

The propagation of flame in complex gaseous mixtures. V. The interpretation of the law of speeds. WM. PAYMAN. *J. Chem. Soc.* **123,** 412–20(1923).—From the exptl. data obtained it appears the law of speeds as applied to the uniform movement during the propagation of flame can be explained on the assumption that the variations in the speed of flame as detd. under standard conditions with mixts. of different compns. depend on the rate of reaction between the inflammable gases and O in the flame front. The law of speeds would hold exactly if this rate of reaction were dependent solely on the temp., so that excess of either inflammable gas, O, or of incombustible gas could be regarded as behaving simply as diluting gas, lowering the reaction temp., but taking no part in the reaction. The fact that the rate of reaction must also depend on the concns. of the reacting gases results in small divergences from the law when the O is in deficit. The correction necessary to allow for this cannot be correctly estd., but the general effect of this factor is to make the speeds of the uniform movement of flame in complex mixts. rather slower than the speeds calcd. from the law of speeds.

CHARLES E. MUNROE

The rate of detonation in complex gaseous mixtures. WM. PAYMAN AND N. S. WALLS. *J. Chem. Soc.* **123,** 420–6(1923).—From the exptl. data the law of speeds applies, within the limits of exptl. error, to the rate of detonation in mixts. of H, O, and N, and in mixts. of CH_4 and H in O in which the O is present in sufficient quantity to burn the inflammable gas completely to steam or to CO_2 and steam and it seems not unlikely that it will apply to other, non-uniform phases in the propagation of flame.

CHARLES E. MUNROE

Notes on my explosives chemistry activities of recent years. I. The Stolberg ammonal explosion. LOTHAR WÖHLER. *Z. angew Chem.* **36,** 85–7(1923).—The explosion occurred April 12, 1920 in the fertilizer works of Schippau & Co. where ammonal was being converted into a fertilizer by admixture with kainite and sand in an incorporating mill, the ammonal contg. approx. 67% NH_4NO_3, 20 powd. Al, 13 TNT, with some peat charcoal and a little red P. The explosion originated in one of two "waggons"

of the product, when it was struck a blow with a pick, and it communicated to the large quantity about, wrecking the fertilizer works and nearby railway station. Apparently 200 tons of ammonal from 15 cm. H. E. shell was involved. It is believed the mixing of the ammonal and kainite was incomplete. W. discusses the possibility of so diluting the ammonal as to make the product safe for use as a fertilizing material. C. E. M.

Sympathetic detonations. C. G. STORM. *Army Ordnance* **3,** 256–60(1923).—With a review of the prior literature a detailed description is given of the tests conducted at the Aberdeen Proving Ground during the past year on the susceptibility of high-explosive shell to sympathetic detonation. 8-in. shell were found most sensitive of all the varieties tested. Piles, up to 608 shell, contg. as much as 20,000 lbs. of detonating explosive, were arranged in two rows, base to base, 8 shell, or about 6 ft. high and the pile was detonated as a whole. This initiating pile of shell was styled "A" pile. The secondary, or "B," piles of similar shell were placed parallel to and about the "A" pile at measured distances. In some piles the shell were placed in the nose-to-nose position; in others in the lateral position. Explosion occurred at as much as 200 in. for the lateral position and 40 in. for the nose-to nose position. Since in other trials explosion failed to occur at lesser distances it is thought some secondary explosions may have been caused by the impact of fragments from the "A" piles. A concrete foundation or wall seemed not to modify the effect. Barriers of 75-mm. ammunition boxes, filled with sand, 13 and 26.5 in. thick were found most effective in preventing detonation of the laterally placed piles. The detonation wave in air was observed up to 2559 ft. to be travelling with a velocity of 364 m. per sec. CHARLES E. MUNROE

Tetryl and other booster charges. FRED OLSEN. *Army Ordnance* **3,** 269–72 (1923).—A description is given of the characteristics of tetryl, TNA (tetranitroaniline), picric acid, hexil (hexanitrodiphenylamine), cyclonite (cyclotrimethylenetetramine), TNB (trinitrobenzene), cyanuric triazide and hexanitrodiphenyl guanidine, all of which have been proposed for use as "booster" *i. e.*, to serve as the intermediary between the cap and the H. E. charge by transmitting and reinforcing the initial explosive impulse of the cap when fired. O. finds tetryl by far the most satisfactory and gives, with some detail, the methods worked out for its production. CHARLES E. MUNROE

Roger Bacon's gunpowder. T. L. DAVIS. *Army Ordnance* **3,** 280–3(1923).—By changing slightly Col. Hime's soln. of Bacon's anagram D. arrives at the conclusion that Bacon's gunpowder formula called for saltpeter 6 pts., or 37.5%, young willow (charcoal) and S, 5 pts., or 31.25% each. CHARLES E. MUNROE

A photographic study of explosions in gases. J. B. DUTCHER. *Phys. Rev.* **15,** 228–9(1920).—The app. is practically the same as that used by Foley in photographing sound waves, with the exception that at the sound spark there is a device for blowing with a mixt. of explosive gases a soap bubble, with the sound spark gap approx. in the center of the bubble. The sound spark generates a sound wave and explodes the bubble of gas. Photographs were obtained of the sound wave due to the spark, both inside and outside of the bubble. The explosion in the gas appears to take place from nuclei, and its character to depend on whether the exploding spark is fat or lean. The explosion surface is so irregular that well defined sound waves are not produced by it.

H. G.

Technical Records of Explosives Supply 1915-1918. IX. Heat Transmission. London: H. M. Stationery Office. 48 pp. 5s. Reviewed in *Chemistry and Industry* **42,** 217(1923).

Laws governing gaseous detonation (MIDGELY, JANEWAY) **21.**

Blasting powder. P. N. STONKOVITCH. Can. 229,108, Feb. 27, 1923. The powder contains 10–20% of a soln. of dinitrotoluene in nitroglycerin absorbed in a powd. mixt. of $NaNO_3$, flour middlings and S.

Paper shot shells. J. S. GRAVELY. U. S. 1,452,040, Apr. 17. Superposed coils of paper impregnated with rubber latex in solidified condition are united with coextensive coils of adhesive material.

Fulminate of mercury. E. A. BARNES. Can. 230,045, Apr. 3, 1923. A soln. of Hg and HNO_3 and alc. is gradually combined by delivering them in sep. continuously flowing streams to a reaction chamber in which predetd. proportions of the liquids delivered and a const. predetd. temp. are maintained. App. is also specified.

25—DYES AND TEXTILE CHEMISTRY

L. A. OLNEY

Progress in dye chemistry in 1922. F. MAYER. *Chem.-Ztg.* **47**, 213–4, 257–8, 273–4, 281–3(1923). E. H.

The testing of vat colors in the dye laboratory. F. L. YOUNG. *Textile Colorist* **45**, 21(1923).—A brief description of a rapid method. CHAS. E. MULLIN

A new class of acid dyestuffs. A. G. GREEN AND K. H. SAUNDERS. *J. Soc. Dyers Colourists* **39**, 39–42(1923).—A new method of forming sol. and acid-dyeing dyestuffs is described wherein one or more $C_2H_4.SO_4H$ groups are introduced and attached to N in the mol., according to the number of replaceable H atoms so attached, as for instance, $R.NH.C_2H_4.SO_4H$ or $R.N(C_2H_4.SO_4H)_2$ (cf. *C. A.* **17**, 992). The compds. are called *sulfato dyestuffs*. Other sulfato-alkyl compds. may also be used in the sulfation but the resulting colors are not as brilliant as the sulfato-ethyl compds. The method is applicable to almost all classes of dyestuffs contg. N and the oxyethyl substituted amino group may be sulfated at any stage of the manuf. by 96% H_2SO_4 or $ClSO_3H$; or a primary amino compd. may be converted into the sulfato-ethyl deriv. by treating its aq. soln. with *B*-$C_2H_4Cl.SO_4H$. Triarylmethyl and quinonimide dyestuffs are readily sulfated cold in a few minutes, but many leuco bases require temps. up to 100° for some hrs. The dyeing properties of the sulfato compds. and the nearest related sulfonated acid dyes are very similar, the sulfato compd. dyeing more level and exhausting equally well. The Na salts of the dyes, prepd. by tetrazotizing a benzidine base and coupling with a sulfato intermediate, possess an affinity for cotton. By sulfation, any basic hydroxyalkyl dyestuff may be converted into an acid dye without dulling the shade. Examples of the application of the method to sp. groups of dyestuffs are given. CHAS. E. MULLIN

Dyeing feathers black. J. R. WILSON. *Textile Colorist* **45**, 109–12(1923).—Feathers resemble wool in dyeing properties, except for the quill which is rather hard to penetrate. They are cleaned at 40–50° in a dil. soln. of soap or Monopole oil and NH_4OH or $(NH_4)_2CO_3$ or a cold soln. of Na_2CO_3 contg. starch. After rinsing at 50° with dil. $(NH_4)_2CO_3$ soln. followed by cold H_2O, they are softened by steeping for 0.5 hr. in hot H_2O. In redyeing stock which has been acid dyed, the old dye is sometimes stripped with dil. NH_4OH soln. followed by soap soln. The feathers are generally dyed in a short bath with about 8% Naphthylamine Black 6B or 4B, Feather Black GS, Acid Black or Wool Black, and H_2SO_4 or preferably formic acid, at boiling for 1–2 hrs. Anthracene Acid Black with 1–2% formic acid is also used and after mordanting with 3% $Na_2Cr_2O_7$ or $K_2Cr_2O_7$, 3% $CuSO_4$ and 1% formic acid, the dyeing is topped with logwood or fustic. Naphthyl Blue Black N, Neutral Wool Black B or G, and Anthracene Acid Black DSN are also used with AcOH or formic acid. Formyl Blue B, Indian Yellow, Acid Green and Orange II are used for shading. After rinsing the feathers are dried by "starching." In "dry starching" the feathers are wiped with a soft cotton cloth or wrapped in the cloth and passed through a loose wringer and then completely coated with fine starch by sprinkling. This is rubbed in, then shaken off, and more starch sprinkled on until the feather is dry. In the "wet starching" method of drying, the rinsed feathers are passed into a thick paste of starch in cold water, wiped with a soft cloth, wrapped in blotting paper, passed through a loose wringer and then exposed to the sun or warm air to dry completely. The starch is removed mechanically. Powd. soap-stone is suggested as a substitute for the starch. CHAS. E. MULLIN

The fading of colors. P. KRAIS. *Naturwissenschaften* **11**, 243–6(1923).—A description of the development of fast coal-tar dyes, and methods devized for measuring their fastness (cf. Heermann, *Färberei- und textilchemischen Untersuchungen*, 4th Ed.). C. C. DAVIS

Some interesting reactions of resorcinol. EMILE LANG. *Bull. soc. ind. Mulhouse* **89**, 24–30(1923).—To a concd. soln. of resorcinol (2 mol.) add an equally concd. soln. of $NaNO_2$ (1 mol.), let stand a day or two at ordinary temp., and heat 2–3 hrs. at 40–50° to remove all traces of $NaNO_2$. There is formed a brown dye which gives good results for printing and for dyeing wool. It is partly fixed by Fe mordants, giving a light green, indicating the presence of the NOH group. Adding powdered Zn to the hot concd. soln. darkens it considerably, without greatly affecting the final shades on printing and dyeing. It readily combines with diazo dyes, giving browns. Addn. to a dil. soln. of the dye at 0° of 1 mol. of $NaNO_2$ per mol. of resorcinol originally used, and then of dil. acid at 0°, gives a nitroso deriv. analogous to dinitroresorcinol. To a cold soln. of resorcinol in twice its wt. of HCO_2H add a wt. of 80% H_2SO_4 equal to that of the HCO_2H,

and let stand a few days at ordinary temp. There is formed an orange-red dye, with green fluorescence in alk. soln., sepd. by almost neutralizing with Na_2CO_3, salting out, and filtering. The salt-free dye can be obtained in about 60% yield by neutralizing with $Ca(OH)_2$, filtering, and evapg. It is considered to be a deriv. of xanthene, which on steaming (especially with dichromate mordant) is transformed into xanthone. It is not fixed by mordants, but prints well on $K_2Cr_2O_7$, giving orange browns on cotton and wool after steaming; and also on wool in AcOH bath followed by ordinary chroming. The colors are fast to washing. Exposure to atm. for a few weeks makes the dye yellower and less sol., and it is then fixed by tannin-emetic, giving an orange yellow. The original dye readily combines with diazo dyes, but the resulting products are of no interest. Treating dihydroxyxanthene with 1 mol. of $NaNO_2$, and then with acid at 0°, yields a compd. (possibly an oxidation product instead of the nitroso deriv.) which is fixed by mordants, giving a brown. The amino deriv. is fixed by mordants in boiling soln., giving exactly the same shade as the hydroxy deriv. (replacing NH_2 by OH, either by heating the diazo or by boiling the amino with NaOH). The latter is fairly readily fixed by mordants, showing the presence of 2 OH groups close together and *o* to a chromophore (Kostanecki's rule). Attempts to synthesize it directly by action of HCO_2H on 1 mol. of resorcinol and 1 mol. of pyrogallol were unsuccessful. Pyrogallol alone behaves in the same way towards HCO_2H as resorcinol. Replacing half of the resorcinol by *m*-tolylenediamine gives similar browns which, however, have more body. The reaction should give an acridine. Oxidizing an alk. soln. of resorcinol at 100° with MnO_2 causes the gradual formation of an intense brown dye. After a few hrs. filter hot, acidify, salt out, and filter. If the reaction is just an oxidation the product should be 2,8-dihydroxydibenzodioxin. If the suggested structures are correct, it would show that the color and shade of a dye depend more on the chromogens and their relative positions than on the chromophores. (Cf. following abstract.) A. PAPINEAU-COUTURE

The tinctorial qualities of a few dyes derived from resorcinol. EMILE LANG. *Bull. soc. ind. Mulhouse* **89**, 31–6(1923).—An investigation to see if other colors derived from resorcinol (cf. preceding abstr.) could be printed on Cr mordant. The various colors prepd. were not fixed by mordant, but were satisfactorily printed on Cr mordant.
A. PAPINEAU-COUTURE

Report on Emile Lang's articles. C. E. MEININGER. *Bull. soc. ind. Mulhouse* **89**, 37–8(1923).—In prepg. nitrosoresorcinol, M. was unable to eliminate the last traces of $NaNO_2$. After several weeks this soln. turns olive, and finally dark blue, turning red on adding mineral acid. The product seems to be related to or identical with the lacmoid obtained by Benedikt and Julius on heating resorcinol with $NaNO_2$. The reaction with HCO_2H is similar to the prepn. of acridines by condensation of 2 mol. of a metadiamine by means of H_2CO or of HCO_2H, the latter possessing the advantage over the former of giving the coloring matter directly. Prepn. of a dye by oxidizing resorcinol on the water bath at 100° in alk. soln. with MnO_2 is original. A. P.-C.

Wool fiber tips and their action in dyeing. WERNER VON BERGEN. *Textilber.* **4**, 23–5, 17–80, 123–6(1923).—In *dyeing* certain *wools* in the hyposulfite-indigo vat, it was noted that the points or tips of the wool fibers were dyed much less deeply than the main portions of the fiber. Similar wool dyed with Anthracene Chrome Brown SWN (Cassella) also dyed unevenly, but the tips were darker than the remainder of the wool. By scouring and dyeing on a small scale samples from various portions of a whole fleece it was found that only the wool from the back showed the uneven effect. This indicated that sunlight causes a chemical change in wool. By exposing a wool which dyed evenly, to sunlight, it was found possible to duplicate the effect. Very small differences in the constitution of colors alter their behavior with respect to these wool tips. Eriochromeazurol B leaves the tips lighter, while Eriochromecyanin R dyes them deeper than the other portions. E. R. CLARK

Quercetin, constitution and uses. G. L. TERRASSE. *Color Trade J.* **12**, 6–9 (1923).—The synthesis, constitution, occurrence, dyeing properties with various mordants, and use in the manuf. of pigments are briefly discussed. CHAS. E. MULLIN

Method of discharge printing on indigo. R. HALLER. *Textilber.* **4**, 121–3(1923).—For discharge printing on indigo, the following is given as an example of a printing paste. To make 1 kg. take 276 g. Anthraflavon GC paste, 24 g. glycerol, 255 g. 2/1 British gum, 55 g. Rongalite C, 55 g. ZnO, 180 g. Rongalite CL, 62 g. $FeSO_4$, 21 g. $SnCl_2$, 72 g. H_2O. After steaming, the goods are passed into 20° Bé. NaOH, followed by souring and washing. Rongalite CL is a mixt. of Rongalite C and Leukotrop W (B.A.S.F.).
E. R. CLARK

Cellulose silk. W. O. MITSCHERLING. *Ind. Eng. Chem.* **15**, 460–1(1923).—An

address in which the various methods of making cellulose silk are reviewed and some of the present problems of the industry are outlined. L. W. RIGGS

Measurement of the luster and covering power of artificial silk. ZART. *Textilber.* **4,** 161(1923).—The Ostwald half-shadow photometer was used to compare several samples of artificial silks. E. R. CLARK

Notes on mercerization. A. J. HALL. *Textile Colorist* **45,** 83–6(1923).—A brief review of the recent work on mercerizing by Pope and Huebner; Willows, Barratt and Parker (*C. A.* **17,** 1151); Ristenpart (*C. A.* **15,** 2728); Liebmann (*C. A.* **15,** 1998); Willows and Alexander (*C. A.* **17,** 1151; **15,** 2728); and Williams (*C. A.* **16,** 340). CHAS. E. MULLIN

Use of zinc dust in wool printing. EMILE CAGLIOSTRO. *Color Trade J.* **12,** 27–8 (1923).—Two formulas for discharge and one for reserve printing are given. CHAS. E. MULLIN

Scouring of low woolens. J. SCHOFIELD. *J. Textile Inst.* **14,** 46–8(1923).—Woolen goods can be scoured by treatment with soda ash soln. at 90° F., which utilizes the free fatty acids in the spinning oils to form a soap. 20 gals. soda ash soln. (6° Tw.) are used per 100 lbs. of wool. Low-grade woolens cannot be scoured in this manner, as the dye in the goods will not stand a warm scour. They are treated with soda ash soln. (12° Tw.). This spoils the lathering by rendering the soap insol., but by a salting out action it keeps the color in the fiber at the expense of perfection in scouring. C. T. WHITE

The action of chemical and physical influences on wool and the testing of wool for its wearing quality. S. VON KAPFF. *Textilber.* **4,** 180–8(1923).—An introduction to succeeding articles. While postponing the testing until the wool is made up into the finished fabric increases the number of var able factors, the testing of individual fibers involves arriving at an av., which is difficult because of the variation between the fibers. Several previously used devices are illustrated. In the latest device used by K. the cloth to be tested is fixed vertically against a hard surface. The pressure against a rotating member which may be covered with various abrasive surfaces is controlled by a wt. and lever mechanism. Testing of abrasion resistance necessitates control of atm. humidity. The amt. of grease and other lubricating substances in the cloth also affects the results. E. R. CLARK

The finishing of organdie. A. MARSCHALL. *Textilber.* **4,** 32(1923); *Color Trade J.* **12,** 172.—The app. used in connection with the Heberlein process for giving light cotton fabrics a stiffened, transparent finish is briefly described. A lead-lined trough equipped with glass guide bars and lead cooling-coils is used for the H_2SO_4 treatment, and the washing vats are of similar construction. Squeeze rolls are made of rubber. The acid is kept at 12–14° by circulating water through the cooling coils. The total time of contact with the acid is 6–8 sec. and the first wash water is 2° Bé. H_2SO_4. E. R. CLARK

The relationship of cotton to water and steam. A summary of the literature. R. G. FARGHER AND A. M. WILLIAMS. *J. Textile Inst.* **14,** 77–82T(1923).—By boiling cotton with H_2O under 2 atm. pressure an ext. which amts. to 1.5–2.0% of the total wt. of the cotton is obtained. It is hygroscopic, faintly acid, and reduces Fehling soln. It contains most of the mineral matter in the cotton. The org. constituents in the ext. have not been identified. At 20 atm. pressure and 150° cotton contg. oxycellulose is completely broken down, yielding $C_{12}H_{22}O_{11}$, while pure cotton cellulose is only slightly attacked under similar conditions. Bleaching likewise renders cotton more liable to attack. By heating cotton at temps. above 130°, H_2O is given off owing to decompn. of the cellulose. Heating cotton with steam at 150° and 10 atm. pressure caused no appreciable loss in strength. In the detn. of the Cu number differentiation is made between the amt. of Cu removed from soln. as Cu_2O, and the Cu salts adsorbed by the cellulose. The latter amt. may be considered as a measure of the adsorptive capacity of the material. C. T. WHITE

Cottonizing and hemp cultivation. P. WAENTIG. *Z. angew. Chem.* **36,** 129–30 (1923).—Owing to the fact that cotton cannot be successfully raised in Germany the cultivation of hemp, flax, and nettle is important. The utilization of these fibers depends upon successful retting and complete sepn. from lignin. C. T. WHITE

Index to (German) patents on retting of bast fibers. HERTHA FLEISCHER. *Faserforschung* **2,** 63(1922).—An extended list of patents classified according to materials recommended as well as names of inventors. E. R. CLARK

Water for use in retting fibers. GOTTFRIED KRÄNZLIN. *Faserforschung* **2,** 126–50 (1922).—Chem. analysis fails to yield information of great significance for the evaluation of a water supply for use in retting flax, etc. While it is generally agreed that Fe and Mn in the retting water cause discolorations of the fibers which are hard to remove

by modern methods of bleaching, it was not found possible to set a max. limit for concn. of these elements. Similarly hard water is generally condemned, but analysis of the highly praised water of the river Lys shows that it actually is rather hard. Complete analyses of 24 waters used in actual retting operations are given. Fe expressed as Fe_2O_3 varies from 3.1 mg. per l. to none. Total hardness expressed on the German scale varies from 24° to 1.5°. E. R. CLARK

Determination of incrusting constituents in flax fiber by saccharification of the cellulose. P. P. BUDNIKOV AND P. V. ZOLOTAREV. *Z. angew. Chem.* **36**, 138–9(1923).—The flax is weighed and charged into a kettle with 8% NaOH and 1.5% $NaHSO_3$ (38° Bé.). The kettle is closed and steam admitted until the pressure reaches 40 lbs. (Russian). The liquor is drawn off and the flax given a second and third boiling with half the amt. of NaOH and $NaHSO_3$ used in the first boiling. By this treatment the flax is freed from foreign matter. The raw flax suffers a loss of 30% in wt. By treatment of 1.0 g. fiber with 8 cc. of 72% H_2SO_4 for 3 hrs., diln. to 3% H_2SO_4 with H_2O, heating at 120° for 2 hrs., then allowing the soln. to react with Fehling soln., a Cu number can be detd. From this value the amt. of cellulose in the fiber can be calcd. C. T. W.

Cellulose-destroying bacteria. N. v. GESCHER. *Faserforschung* **2**, 28–40(1922).—Cultures of organisms active in the disintegration of plant cells were obtained by incubation of blotting paper impregnated with garden earth, slime from ponds, etc. Cellulose-destroying bacteria were present as well as the forms which attack pectins. The strains isolated were highly selective, as those which developed on purified cellulose, oxycellulose (Witz), and hydrocellulose (Girard) could not be developed on wood, leaves, or the pectins of the flax stalk, and *vice versa*, those which resolved pectins did not grow on cellulose. The cellulose-destroying forms are favored by high temp. (30–60°), alkalinity and aeration. Hence in *flax retting* the opposite conditions should be maintained as well as possible, to avoid injuring the fiber. E. R. CLARK

The bleaching of yarn made from bast fibers. E. CLAYTON. *J. Soc. Dyers Colourists* **39**, 31–7(1923).—A general description of the operations prepg. flax for spinning is followed by a discussion of the impurities in raw flax. C. extd. highest grade hackled Courtrai flax 10 times with boiling H_2O for 10 periods of 0.5 hr. each and upon evapn. of the combined exts. obtained 3.54% of fairly hard, brittle, scaly, dark brown, slightly hygroscopic residue having a not unpleasant odor. The aq. exts. were clear before evapn. with little pptn. upon standing, but the evapd. residue was only slightly sol. in boiling H_2O, sol. in alkalies and insol. in alc. The dried flax was next extd. for 0.5 hr. with boiling petroleum ether which upon evapn. gave 1.08% of dark yellowish brown, stiff greasy residue, m. 54°. This residue was sol. in hot alc. but was little altered on boiling with NaOH. The sample, dried, was then extd. with boiling abs. alc. and gave 0.5% (on the original wt. of the flax) of pale greenish, sticky, greasy residue of peculiar odor, which appeared unsaponifiable. The flax was finally boiled 1 hr. in 1% aq. KOH soln., giving a dark brown soln. A second boiling in a similar soln. gave very little color. The loss in wt. was about 14% of the original wt. of the fiber. The finest fabrics are made from "boiled yarn" which has been kier boiled several hrs. at 5–7 lbs. pressure with a soln. contg. 90% Na_2CO_3 and 10% NaOH. Boiling 4–6 hrs. in a 1.015–1.02 sp. gr. soln. gives a loss in wt. of about 16%. The hanks are then well washed, dried, and the bleaching is completed after weaving. "Full white" yarns give the second best fabrics, and these are followed by "three-quarter white," "half white," "creamed" and "green or gray" yarn, respectively. Creamed yarn is produced by steeping overnight in alkali or boiling 0.75–1 hr. at 5–7 lbs. pressure with 90% Na_2CO_3 and 10% NaOH, rinsing, reeling in $Ca(OCl)_2$ soln., d. 1.01–1.02, for 30–40 min. at 18°, washing, souring in H_2SO_4, d. 1.005–1.0075, for 0.5 hr. and again washing. Half white yarn is creamed, rinsed again, reboiled in a weaker Na soln., (called "scalding"), and rechemicked by steeping instead of reeling. Three-quarter and full white yarns are creamed and given two or more scalds together with the intervening operations. In bleaching flax Na_2O_2 does not appear to have any decided advantages over hypochlorite, especially on the sprit. Jute and hemp are bleached by giving a mild alkali boil, rinsing, steeping in NaOCl soln., washing, treating with dil. $NaHSO_3$ or $Na_2S_2O_3$ soln. and washing. Na_2O_2 usually gives the best results with jute. The *theory of linen bleaching* is discussed. C. E. M.

The acid chlorine bleach. E. RISTENPART. *Textilber.* **4**, 74(1923).—Varying amts. of H_2SO_4 were added to sep. portions of a stock soln. of bleaching powder, and the value of these for bleaching cotton fabric was detd. by comparison of the whiteness, oxycellulose content, and tensile strength of test swatches, bleached in them according to a standard method. The best whiteness resulted from the use of a slightly acid bath but the strength of the fabric was impaired more than in the alk. or strongly acid baths. Similarly the oxycellulose content of fabric bleached in a mildly acid bath was greatest.

Strongly acid bleach liquor gave a very poor white. The great activity of the weakly acid bath is ascribed to free HClO. On increase of acidity this is converted to free Cl. Use of a two-bath process (*C. A.* **16**, 4354) is recommended. E. R. CLARK

The action of formaldehyde in chlorine bleaching. E. RISTENPART, P. WEYRICH AND P. WIELAND. *Textilber.* **4**, 173–5(1923).—The action of various metals in causing over-oxidation of cotton during bleaching with hypochlorites (cf. *C. A.* **9**, 2816) may be checked by adding HCHO to the chemic. Simultaneously the bleaching action is accelerated and a better white produced. In alk. bleach liquor, HCHO is only slowly oxidized and by proper adjustment of concns. an effect, similar to that of CO_2, may be produced, the chemic slowly becoming acid. The rapid decrease of available Cl in chemics contg. HCHO would prevent their technological utilization. E. R. C.

Cold bleaching (bleaching without boiling-out). GERHARD HABERMANN. *Faserforschung* **2**, 1–9(1922).—Linen and cotton material may be successfully bleached to a permanent white with minimum consumption of fuel by substituting for kier boiling treatment, in an app. designed to attain effective circulation of the liquor, with a cold soln. of NaOH, or of NaOH and Na_2CO_3. After 1–2 hrs. the goods are washed and soured, and then chemicked in the usual hypochlorite bath or otherwise. The operations must be repeated 4 times for a good white. Tensile strength and wt. are greater than when alkali boiling is used and the bleached material is as absorbent. The consumption of chemicals is much greater than in the common process. Chemical analyses of the products are lacking. E. R. CLARK

Azo dyestuffs. H. WAGNER. Can. 229,148, Feb. 27, 1923. A dye of excellent fastness to kier boiling and with a high capacity for being discharged and fast to light consists of a coupled halogen-substituted diazo compd. and an *o*-toluidide of 2,3-hydroxynaphthoic acid.

Black azo dyes. A. L. LASKA and A. ZITSCHER. U. S. 1,452,083, Apr. 17. Black dyes are formed from diazotized *o*-ethoxy-*m*-tolueneazo-1-naphthylamine and *p*-anisidide of 2,3-hydroxynaphthoic acid or other diazo compds. of an arylazo-1-naphthylamine compd. not contg. a sulfo group and an arylamide of 2,3-hydroxynaphthoic acid. They produce a fast black on cotton.

Dyeing apparatus. F. C. W. STELTER. U. S. 1,452,129, Apr. 17. A paddle wheel moves goods to be dyed in dye liquor between vertical parallel inner and outer walls of an eliptical dye vat.

Finishing cotton fabrics. C. L. SCHUTTIG. U. S. 1,451,306, Apr. 10. A permanent finish on cotton fabric which gives it a stiffened effect is produced by subjecting the fabric at a temp. of 0° to a soln. formed of 43–45° Bé. HNO_3 2, and 66° Bé. H_2SO_4 1 part, to convert the surfaces of the fibers into a lower cellulose nitrate, arresting the action of the soln. with H_2O, expressing the H_2O, treating the fabric with NaOH soln., washing, stretching and drying.

Shot effects not to be stained in piece dyeing. R. HAYNN and F. MÜNZ. U. S. 1,451,299, Apr. 10. Shot effects not to be stained in piece dyeing are produced by treating animal fibers in a mixt. of glacial HOAc and Ac_2O with addn. of catalyzers such as H_2SO_4, and, preferably, subsequently treating with Cr fluoride.

Balloon fabric. E. and B. TRENCKMANN. U. S. 1,452,229, Apr. 17. Gas-tight balloon envelopes are formed of cleaned entrails of cattle or other quadruped animals, overlapped and united by adhesive so that one piece bridges the joint between 2 other adjacent pieces, all covered with adhesive and with another fabric.

Rake teeth for carbonizing acid bowls. A. C. SARGENT. U. S. 1,451,926, Apr. 17. Teeth for rakes which may come into contact with dil. H_2SO_4 in carbonizing acid bowls or similar materials are formed with a core of Fe or other metal and a casing of acid-resisting material such as sheet Pb which is beaded into retaining grooves in the core.

26—PAINTS, VARNISHES AND RESINS

A. H. SABIN

Study of the anti-rust properties of commercial paints. VILA. *Recherches et inventions* **4**, 181–90, 201–10(1923).—A detailed description of tests carried out to show that various Pb-free paints are as efficient as Pb paints. A. PAPINEAU-COUTURE

An industrial poison—white lead. J. L. BRETON. *Recherches et inventions* **4**, 231–47(1923).—An address. B. describes expts. proving that a toxic Pb compd. is given off from surfaces freshly painted with Pb paints, and that the toxicity is not due to the presence of spirits of turpentine. A. PAPINEAU-COUTURE

Respective roles of lead and essence of turpentine in painters' disease. F. HEIM, E. AGASSE-LAFONT AND A. FEIL. *Compt. rend.* **176,** 270–1(1923); cf. *C. A.* **16,** 2926.—The pathologic conditions exhibited by painters have been attributed to the actions of both Pb and turpentine. Of 21 workmen who had handled only turpentine and zinc white no pathologic renal conditions were detected, but a notable hypertension was observed in 2 cases. In 14 painters handling Pb, 2 cases of albuminuria and 2 of hypertension were observed. Among 200 painters handling Pb, 30% showed hypertension. The conclusion is that Pb and not turpentine is the cause of both the renal lesions and the hypertension. L. W. RIGGS

Paint colors formerly and now. HEINRICH TRILLICH. *Z. angew. Chem.* **36,** 190–2(1923). E. H.

Some fundamental paint characteristics. R. L. HALLETT. *Paint, Oil and Chem. Rev.* **75,** No. 14, 10–1, 20–1; No. 15, 10–1(1923).—A discussion of the causes and remedies for scaling, chalking, discoloration and other defects of paint films. F. A. WERTZ

Fundamentals of colloids as applied to paints and varnishes. E. W. FASIG. *Paint, Oil and Chem. Rev.* **75,** No. 12, 10–1; No. 13, 10–1, 21(1923); cf. *C. A.* **16,** 1671.—A review (lecture). F. A. WERTZ

The testing of durability and rust-preventive properties of paints. RUDELOFF. *Mitt. Materialsprüfungsamt.* **39,** 232–40(1913).—In the suggested methods of tests, the paints are applied to sheet iron, pine, and cement panels; their spreading rates, drying time, relative hiding power, av. thickness of film, etc., are detd. Small sections of the coated metal panels are bent over rods of various diams. to det. relative elasticity. Resistance of the film to weather, corrosive moist vapors (NH_3, HCl, Cl, SO_2, H_2S), flue gases, extreme temp. changes, sea water, etc., is detd. The durability of the film is judged by changes in appearance and eventually by differences in behavior on bending the metal panels from time to time. Rust formations are usually visible on the surface, but if desired, the films may be removed with boiling aniline or with phenol. No results obtained by the suggested test methods are given. F. A. WERTZ

Examination of writing inks. F. F. RUPERT. *Ind. Eng. Chem.* **15,** 489–93 (1923).—A system of rating writing inks giving equal weight to color, permanence, stability, and non-corrosiveness is suggested; and the methods of tests, essentially those of the Bur. of Standards (*C. A.* **14,** 2864), are given in detail. F. A. WERTZ

Study of the plasticity of paint. E. C. BINGHAM, H. D. BRUCE AND M. O. WOLBACH, JR. *J. Franklin Inst.* **195,** 303–17(1923).—Suspensions, as well as the emulsoid colloids, show the properties of plastic materials even at very low concns. of the disperse phase. The viscosity is not a const. but a function of the shearing stress. At higher concns., the relation of yield value to concn. is linear and the material is truly plastic; at lower concns., this relation is not linear and the material is merely pseudo-plastic. The transition from the pseudo-plastic to the plastic state occurs, in the case of lithopone suspended in linseed oil, when the mixt. contains 14% by vol. of lithopone. Since the mobility-concn. (by wt.) curve is linear, the plasticity of any paint made by thinning may be predicted by detn. of the plasticity of both (*a*) a given paint and (*b*) a paint made from the first by thinning; in this procedure the plasticity correction for pseudo-plastic paints is neglected. When the mixt. contains 45.6% by vol. of lithopone, the mobility is 0; this phenomenon apparently is simply connected with the pore space of the material and may have considerable significance in the detn. of the flow of dispersion. JOSEPH S. HEPBURN

The pinene of Spanish turpentine. A. MADINAVEITIA. *Anales soc. espan. fis. quim.* **20,** 531–3(1922).—In the examn. of a number of samples of turpentine from various parts of Spain the fractions b. 154.5–157°, assumed to be pure α-pinene, were found to have abnormally low optical rotations. This was shown to be due to the presence of small amts. of nopinene. L. E. GILSON

Fractionation of turpentine oil. W. F. SUDRO, *J. Am. Pharm. Assoc.* **12,** 219–22 (1923).—Five gal. of turpentine was steam-distd. and the distillate collected in l. lots. The d_{20} varied from 0.862 to 0.870; n_D^{20} 1.4660 to 1.4708; $[\alpha]_D^{23}$ 15.25° to 7.4°. Each of the 16 fractions was distd. over a naked flame and the fractions up to 155, 155–6, 156–7, 157–8 and 158–60° were collected separately. The physical consts. of each of these fractions are given in tables. Most passes over between 157° and 158°. L. E. W.

The mechanism of polymerization and depolymerization of resins. MAURICE DE KEGHEL. *Rev. prod. chim.* **26,** 109–16(1923).—Reasoning by analogy from the behavior of tung oil, K. concludes that resins, which are liquid when they exude, consist of acids and esters forming a disperse phase in a polyhydric alc. sol. (so-called "copal oil") in the form of elements of irregular dimensions called "particles." Each

particle consists of a nucleus (called "granule") of ultramicroscopic dimensions and of a variable no. of mols. of esters and acids. The particles possess Brownian motion, and the granules tend to join together, the surrounding layers of esters and acids disintegrating thereby. These changes constitute maturation. When they have proceeded far enough the resin sets to a soft mass, and the colloidal state is destroyed. The subsequent hardening is due to polymerization of the esters; time, temp., and possibly pressure, are secondary factors; and the degree of hardness depends on the state of polymerization reached. By heating under such conditions as to prevent dissociation, the resins can be softened to practically the same condition as when they were flocculated. If the softened resins are heated in water in an autoclave at gradually increasing pressures and for progressively increasing lengths of time, they can ultimately be heated far above their initial m. p. without any signs of incipient fusion or deformation, with decrease in acid no. and sapon. no., increase in m. p., softening temp., and I no., but practically no change in color. Amber, when subjected to this treatment, undergoes practically no change (decrease in I no. from 95 to 91, no change in m. p. and softening temp.), presumably because it is the oldest resin and has reached the final stage of polymerization. Demerara after several treatments (ending with 300 hrs. at 38 atm. and 344°) acquires consts. fairly close to those of amber. Others give similar results. K. infers that the various resins are of the same nature, but have reached different stages of polymerization. When resin is heated directly, (*i. e.*, without water) in the autoclave, it is depolymerized and liquefied and partially dissociated with partial transformation into gas. By heating in the presence of an inert gas at such a pressure that as the temp. increases the pressure of the gas is always greater than the dissociation tension of the resin, the resin is liquefied without loss or change in its chem. compn., and no gas is formed. If the heating is carried beyond a certain temp. and pressure (not stated) there is formed a mobile liquid with an odor faintly recalling that of fuel oil, and quite inflammable, with elimination of up to 35–40% of H_2O. Resin liquefied by heating in the presence of an inert gas solidifies and hardens on cooling; but if heated in the presence of fatty oils on liquefying it dissolves in the latter. The melted resin mols. receive a charge from the protective colloids of the oil and retrograde to the condition of disperse phase in the oil (as dispersing medium), giving an irreversible colloidal soln., *vis.*, the varnish. The merits of this process of *varnish manuf.* are discussed, and examples are given of the changes caused by artificial polymerization, and varnishes prepd. by the described process from natural resins and from artificially polymerized resins are compared. A. PAPINEAU-COUTURE

DESMAREST and LEHNER, S.: **Manuel pratique de la fabrication des encres.** 3rd. Ed. Revised and enlarged. Paris: Gauthier-Villars et Cie. 372 pp. F. 12.

Coumarone paint. C. ELLIS. U. S. 1,451,092, Apr. 10. A quick-drying paint adapted for use on wood or other materials is formed from white lead, mineral red or other pigment, coumarone resin m. about 90° and a solvent comprising both paraffin and aromatic hydrocarbons, *e. g.*, heavy benzine or painters naphtha.

Silicate paint. L. SEIDEMAN. U. S. 1,452,445, Apr. 17. A paint which may be used for "*bronzing*" *leather* is formed of bronze powder, Al or other metallic powder, glycerol or a vegetable oil such as corn oil and a water-sol. silicate.

Paint and varnish remover. A. W. SCOLES. Can. 229,099, Feb. 27, 1923. The compn. contains NaOH 80, $(NH_4)_2CO_3$ 8 and corn starch 12%.

Enamel. A. F. POZDECH. U. S. 1,452,219, Apr. 17. A quick-drying enamel is formed of ground zinc white 0.5 pint, French varnish 2 oz., benzine 10 drops and lacquer 0.5 oz.

Resinous condensation products. H. PLAUSON. U. S. 1,451,843, Apr. 17. A vinyl compd., *e. g.*, vinyl acetate or a vinyl ether, is condensed with a phenol and CH_2O (as a polymer) in the presence of an accelerator, *e. g.*, an org. anhyd. or non-explosive ozonide. Fiber or other fillers may be added.

27—FATS, FATTY OILS, WAXES AND SOAPS

E. SCHERUBEL

Afzelia brieyi. J. PIERAERTS AND L. L'HEUREUX. *Mat. grasses* **15**, 6374–8 (1923).—The morphological characteristics of *Afzelia brieyi* (De Wild) and of its seeds are described. The seeds contain 89.25% kernel, which has the following compn. on the dry basis (8.23% H_2O): total ash (contg. 0.40% P_2O_5) 2.71, water-sol. ash 1.24, crude fat 29.84, total N 2.24, crude protein 14.00, crude fiber (Weende) 2.77, pentosans 7.13, furfuroids 0.54, reducing sugars (as glucose) 0.51, sucrose (by invertase) 4.44, carbohydrates hydrolyzed by 3% H_2SO_4 under pressure (as glucose) 50.31%. Compn. of the ash: SiO_2 0.36, SO_3 2.70, P_2O_5 14.76, Fe_2O_3 + Al_2O_3 0.61, CaO 11.21, MgO 14.76, K_2O 26.83, Na_2O 1.73, Cl 0.82, Fe 0.376, Mn 0.072, alky. of water-sol. ash (as K_2CO_3) 69.40%. Oil was prepd. by extg. with anhyd. Et_2O, dried over anhyd. Na_2SO_4, and redistd. in a Vigreux column (*A*), and also by extg. with petrolic ether boiling below 50° (*B*). *A* was reddish yellow, and a small amt. of solid fat sepd. in a short time. *B* was brownish yellow and remained homogeneous several days. They have a bland, agreeable flavor, and an after-taste resembling that of certain olive oils. Analyses of *A* and *B* gave resp.: $d_{19.5}^{19.5}$ 0.9328, 0.9320; n_{40} 1.4749, 1.4750; Crismer no. (in sealed tube with 1 vol. of oil and 2 vol. of 99.6% alc.) 60.6°, 62°; acid no. 5.1, 3.2; equiv. oleic acid 2.6, 1.6%; sapon. no. 184.4, 183.8; sapon. no. after acetylation 218.1, 216.9; I no. 142.4, 144; Hehner no. 95.15, 95.33; R.-M. no. 0.56, 0.56; Polenske no. 0.51, 0.71; Ac no. (*via* E. André) 39.79, 38.40; hexabromide reaction neg., neg.; Baudouin reaction neg., neg.; Millau-Becchi reaction strong reduction in both cases; Maumené no. 124°, —; Halphen reaction orange shade, brownish orange with reddish tinge. There were no alkaloids nor cyanogenetic glucosides. The solid fatty acids prepd. as usual from $^{B}/_{4}$ gave: m. p. 53–54.6°, solidifying point 52–50.5°, n_{50} 1.4678, neutralization no. (cold) 180.9, equiv. av. mol. wt. 310.1, neutralization no. (hot) 200.1, equiv. av. mol. wt. 280.3, I no. 135, hexabromide reaction negative, Baudouin reaction negative, Millau-Becchi reaction strong reduction, Halphen reaction negative. Expts. (described in detail) show that the oil is semi-drying, and that its solidification is due to isomerization and polymerization and not to oxidation. The results are commented upon.

A. PAPINEAU-COUTURE

Mechanism of the catalysis of hydrogenation by nickel. M. C. BOSWELL. *Trans. Roy. Soc. Canada* **16**, Sect. VII, 1–25(1922).—Quant. study of reduction of NiO by H, and of the catalysis of the hydrogenation of C_2H_4 by partially reduced NiO, indicates that the O necessarily present in a normal Ni catalyzer is present in 2 conditions, as unchanged NiO in the interior of the particles, and as OH^- groups accompanied by H^+ on the Ni surface of the particles. Adsorbed H is represented as H^+ and H^- formed on the Ni surfaces. Four reactions are suggested for the mechanism of catalysis.

A. T. CAMERON

Rubber-seed oil. CHARLES L. LOCKETT. *India Rubber Rev.* **23**, No. 4, 510(1923).—A summary of its source and properties.

C. C. DAVIS

Liver oil of the Squalus acanthias from the waters of Morocco. SERGIO BERLINGOZZI AND MARIA TOMASINI. *Ann. chim. applicata* **7**, 29–33(1923).—The oil pressed hot from the livers of the young *Squalus acanthias* is a thick clear amber-colored liquid with a characteristic fish odor and faint acid reaction, little sol. in EtOH and very sol. in Et_2O. It does not solidify at 0° but deposits small amts. of a white solid. With H_2SO_4 a red-wine color is formed changing to brown, with fuming HNO_3 violet changing to green then to brown, with HCl no color, with H_3PO_4 no color, shaken in $CHCl_3$ with aq. phosphomolybdic acid, a blue ring at the surface of the 2 layers, and a drop in CS_2 shaken with a drop of concd. H_2SO_4 a violet-purple color rapidly changing to brown. The consts., d_{15} 0.9248, m. p. —3° to —5°, n_{25} 1.4761, m. p. of fatty acids 33–4°, H_2O 0.085%, acidity (oleic acid) 1.7, thermosulfuric index 107, sapon. no. 188, I no. 140, Reichert-Meissl-Wolny no. 0.6, acetyl no. 20, Hehner no. 94, ether no. 184, squalene 1.1%, cholesterol 2.9%, indicate an oil well adapted for pharmaceutical use. *Hydrogenation of the oil* gives yields varying with the catalyst, temp. and pressure. The oil mixed with 2% basic Ni carbonate was treated with H and the hydrogenation detd. at intervals by the decrease in the I no. which in 0.5 hr. was approx. 80, in 1 hr. 60, in 2 hrs. 55 and 5 hrs. 51. The product after 4 hrs. is a yellowish brown solid with odor of suet, m. 41–2°, resolidifying at 32–3° and I no. 53.

C. C. DAVIS

Dry distillation products of the sodium salts of the fatty acids from herring oil. MASAO HIROSE AND CHUGO YAMADA. *J. Chem. Ind.* (Japan) **25**, 1428–38(1922).—To utilize apparently useless ill-odored soap, produced by tons during the refining of

fish oils, the nature of its dry distn. products was studied. The sample contained 68.44% total fat (60.92% combined fatty acids as soap, 0.27% free fatty acids, calcd. as oleic acid, 7.25% free fatty oil), 6.57% combined alkali (as Na_2O), O-free alkali, 15.60% H_2O, and 14.43% ash (0.5% NaCl). When the sample was dissolved in H_2O and decompd. with HCl and extd. with Et_2O, solid fatty acids were obtained which had d_{15} 0.9088, acid no. 173.9, sapon. no. 198.2, Wijs no. 115.6, n_{20} 1.4670. The original sample was heated in a Cu vessel at ordinary pressure up to 560°. The products of distn. of 1 kg. are 171.3 g. H_2O, 527.8 g. oily liquid, 184.4 g. residue, and about 73.5 l. gas. The oily matter has d_{15}^{15} 0.8196, acid value 0.54, sapon. no. 2.25, Wijs no. 117.9, and n_{20} 1.4617; viscosity (Redwood 30°) 31.4 and flash point below room temp. It has crude petroleum odor, greenish yellow with strong bluish purple fluorescence, and becomes darker on exposing to daylight. The more detailed analysis of further fractional distn. of this matter is given. The residue contains 61.52% Na_2CO_3, 2.54% Na_2O, 3.12% NaCl, and 31.56% insol. matter. From this, economical recovery of soda and sepn. of a powerful absorbing and deodorizing charcoal are possible. The gas is composed mainly of methane. Chem. reactions occurring during this dry distn. are considered in detail.
S. T.

A new distinction between sodium and potassium. C. W. L. BOURLET AND W. THOMAS. *Chem. News* **126**, 193(1923).—"To distinguish between a potash and a soda "soft" soap it is only necessary to prep. a 15% aq. soln., measure the efflux time at const. temp. from a pipet; then add 4% phenol. In the case of a potash soap the efflux time will be increased; in the case of a soda soap decreased." W. H. BOYNTON

The nature of soap solutions (LEETEN) **2.**

Polymerization of unsaturated fatty acids. H. HAUSMANN and J. LUND. Can. 229,247, Feb. 27, 1923. Impure unsatd. fatty acids are sapond., the resulting soap being pptd. with salt and heated under pressure to a temp. below 250°. The steam and water are partially removed and the product is heated under pressure to 200° with an alk. base after which the polymerized acids are sepd.

Centrifugal separation of waxy material from oil. C. A. PORTER and O. C. BREWSTER. U. S. 1,452,388, Apr. 17. Oil associated with waxy material is treated with gasoline or other solvent to reduce its viscosity and refrigerated to cause solidification of a large part at least of the waxy material, centrifuged while floating on a $CaCl_2$ soln. or other aq. liquid and the clear oil and sepd. waxy material are withdrawn in sep. masses. The waxy material is then treated with a sufficient amt. of warm aq. liquid to melt it and subjected to a second centrifugal sepn.

Cleansing with soap mixtures. I. POLLACK. U. S. 1,452,093, Apr. 17. The surface to be cleansed, *e. g.*, the hands, is first rubbed with a mixt. formed from soap, sand, $KMnO_4$, starch and borax and then rubbed with a second mixt. formed of soap, sand, $NaHSO_3$, starch and borax.

Antiseptic and insecticidal soap mixture. R. MACPHERSON and W. E. HEYS. U. S. 1,451,670, Apr. 10. Soap 80 is mixed with Na or K benzoate 10 and tar 10 parts. Cf. *C. A.* **17**, 347.

Nickel formate. C. ELLIS. U. S. 1,452,478, Apr. 17. Ni formate adapted for use in hydrogenation of oils is prepd. by forming a soln. contg. both Ni sulfate and Na formate, evapg. the soln. to about 37° Bé. to deposit Ni formate, and filtering and washing the Ni formate.

Apparatus for charging cacao butter presses. W. E. PRESCOTT. U. S. 1,451,432, Apr. 10.

28—SUGAR, STARCH AND GUMS

F. W. ZERBAN

Recent ideas on the structure of sugar. H. COLIN. *Bull. assoc. chim. sucr. dist.* **40**, 243–50(1922).—A review of the chemistry of sucrose. W. L. MCCABE

The determination of sucrose in molasses in the manufacture of beet sugar. L. VENDITTI. *Boll. assoc. ital. ind. zucchero* **15**, 28–31(1922); *Chimie et industrie* **9**, 575 (1923).—The amt. of uncrystallizable sucrose remaining in molasses depends on the non-sugar content of the latter. V. tries to calc. the total amt. of non-sugars % of the beets worked which remain in the juice after purification and that which is present in impure sugar. He gives 2 formulas, one relating to the defecated juice and the other

to the crystd. sugar. If x is the amt. found for the defecated juice and y for the crystd. sugar, then $x-y$ is the amt. in the molasses. If P is the polarization of the sucrose in the molasses and N the non-sugar content, 1 part of non-sugar will prevent the crystn. of P/N parts of sucrose, and the amt. of uncrystallizable sugar is $(x-y)P/N$. The original article describes how V. arrives at these formulas, which depend on 4 factors: sucrose content of the beets, total loss of sucrose, purity coeff. of the purified juice and purity coeff. of the molasses. Applications of the formulas are illustrated by 4 examples. The 4 above factors are very closely related to the proper working of a beet sugar factory, and their relationship allows of controlling operations. A. PAPINEAU-COUTURE

Determination of ash in cane sirup and molasses. J. F. BREWSTER. *J. Assoc. Official Agr. Chem.* **6**, 365–9(1923); cf. *C. A.* **15**, 2207.—Detns. were made on 3 cane products, a sirup, a first, and a final molasses, by 4 analysts, using the 3 official methods; different temps. were used by 2 of the analysts. The sulfated ash method gave better agreement than the other two, but the correction factor is uncertain, varying from 14.05 to 18.54%, instead of being 10%. A temp. of 475–500° was found best; at higher temps. lower results were obtained, except in the sulfated ash method. Each analyst checked closely with himself, but not so well with others. The use of NH_4 carbonate offers no advantages. The electric muffle, insuring an oxidizing atm., is preferable to the gas muffle. Pt dishes give more reliable results than silica dishes. It is recommended (1) that the plain incinerated ash method be given official preference for the detn. of ash in cane sirups and molasses; and that the lixiviation method be used only when it is found impossible to get a C-free ash by the shorter method; (2) that the sulfated-ash method be discontinued as an official method. F. W. ZERBAN

Use of nickel dishes for ashing saccharine products. W. L. O. WHALEY. *J. Assoc. Official Agr. Chem.* **6**, 370–3(1923).—In a search for cheaper dishes to be used for ash detns. in sugar control labs., Ni dishes were tried. The dishes color upon heating in an elec. muffle at the temp. customary for ashing, but the effect on their wt. is negligible. After over 40 detns. of incinerated ash had been made in each of 12 crucibles, these were cleaned with warm H_2SO_4 (1 vol. concd. acid and 9 vols. water). Ten had decreased in wt., and 2 increased; the change in wt. averaged —0.13 mg. per detn., with a min. change of —0.05 mg., and a max. change of —0.43 mg. Even with a charge of only 1 g. of material, the max. change would cause an error of only 0.043% in the ash, which is well within the limit of error permissible in control work. Parallel detns. in Pt dishes gave differences of less than 0.1% in the ash, and the ashing took twice as much time. Ni dishes can therefore be recommended for detg. plain ash in sugar products in the factory lab. F. W. ZERBAN

Determination of ash in Cuban raw sugar. U. S. JAMISON AND J. R. WITHROW. *Ind. Eng. Chem.* **15**, 386–9(1923).—Ash detns. in a 96-test sugar showed that direct incineration is the quickest method and gives const. results. Preliminary heating on a hot plate of the sugar dissolved to a sirup reduces tendency to foam. Addition of oil has the same effect, without influencing the final results. Lixiviation of the ash offers no advantage. The sulfated-ash method can be shortened by using a mixt. of 1 vol. concd. acid and 2 vols. water, instead of first water, and later concd. acid. The correction factor for sulfated ash to incinerated ash for this sugar was 0.66. The methods requiring the use of benzoic acid, sand or NH_4 carbonate are apt to give low results, while the ZnO method gives higher results than plain ashing. Porcelain crucibles are just as good for both sulfated and plain ash as Pt crucibles. F. W. ZERBAN

The composition of native Malay sugar (Pula malacca). HAROLD LOWE AND ALBERT HOULBROOKE. *Analyst* **48**, 114–5(1923).—The sample analyzed was made from the juice of the coconut palm. E. J. C.

New progress in the improvement of arable land for sugar beet culture. JULES STOKLASA. *Bull. assoc. chim. sucr. dist.* **40**, 109–16(1922).—A review. W. L. M.

Variation in the composition of sugar beets left undug over winter. V. SKOLA. *Z. Zuckerind. Cechoslovak. Rep.* **46**, 239–43(1922); *Expt. Sta. Record* **47**, 828.—Analyses of sugar beets remaining undug during the winter showed that the leafage lived on and formed albumins from simple nitrogenous material, a process comparable with after-ripening. The great portion of the leaf N was lost, only a small part being taken up by the root. The ash of the leaves diminished to a much greater extent than that of the roots. The sugar decreased, being consumed as reserve material by the plant, which prepd. itself naturally for the second growth year. H. G.

Difficulties experienced with a Fulton crusher. A. C. SLOTEMAKER. *Arch. Suikerind.* **31**, 101–5(1923).—This crusher after short use began to slip badly, thus cutting down the capacity of the mill. After a number of only partially successful attempts, the trouble was finally remedied by setting the scraper at a distance of a

fraction of a mm. from the crusher roll, so as to avoid direct contact and the consequent polishing effect. F. W. ZERBAN

Notes on starch. F. W. TIEBACKX. *Pharm. Weekblad* **60,** 338–9(1923).—The viscosity of a starch soln. is proportional to its content of amylopectin, a H_3PO_4 ester. Heating or long standing of the soln. causes hydrolysis of the amylopectin, accompanied by loss of viscosity, and increase in cond. and in p_H value. A possible relation between diastatic activity and the P present in the starch is suggested. A. W. DOX

The difference between the adsorptive powers of charcoal from common and from glutinous starch (TADOKORO, NAKAMURA) **2.** Saccharification of wood (HÄGGLUND) **22.**

Purifying and filtering sugar solutions or other liquids. C. D. MORTON. U. S. 1,450,560, Apr. 3. The sugar juice, sirup or other liquid to be treated is mixed with an absorptive agent such as amorphous C and repeatedly passed across a filtering medium so as to retain the absorptive agent in suspension while permitting the passage of clear filtrate, fresh liquid being added in proportion to the passage of liquid through the filter.

29—LEATHER AND GLUE

ALLEN ROGERS

The neutralization of chrome leather. L. MEUNIER AND P. CHAMBARD. *J. Soc. Leather Trades Chem.* **7,** 75–83(1923).—See *C. A.* **17,** 896. C. T. WHITE

Report of the Commission of the French Section of the Society of Leather Trades' Chemists on the Quantitative Analysis of Tanning Materials. G. HUGONIN. *J. Soc. Leather Trades Chem.* **7,** 58–68(1923).—See *C. A.* **17,** 349. C. T. WHITE

Chrome tanning. IX. Part II. A bibliography of chrome tanning. DONALD BURTON. *J. Soc. Leather Trades' Chem.* **7,** 114–6(1923); cf. *C. A.* **16,** 2618.—References are given on "Principles and Methods" (42), "Analysis" (10), "Patents" (9). E. H.

The acetic acid test and tanning through. GEORG GRASSER. *Collegium* **1922,** 383–4.—Fe-tanned leather is not truly tanned since it is readily dyed by sulfonic acid dyes and swells in AcOH but without becoming gelatinous. Sulfite cellulose also changes but does not tan hide substance for only the outside of the treated hide appears tanned by the dye test and AcOH turns it glassy although swelling it only a little. Fe-tanned leather retanned with sulfite cellulose is, however, shown by both tests to be tanned, probably because the latter changes the Fe to a true tanning compd. The AcOH test is reliable. I. D. CLARKE

The so-called dry tannage. KARL SCHORLEMMER. *Collegium* **1922,** 375–9.—In dry tanning the skins are drummed for 4–5 hrs. in a concd. Cr liquor; the tanning is then complete. Practically all of the liquor is absorbed. The advantages are that the pickle can be eliminated, there is a saving of time and power, and the amount of waste liquor is small. The grain of the leather is satisfactory and there is no unusual heating in the drum. Four skins were tanned with "Chromesco," 2 by the dry and 2 by the usual method. Those tanned by the dry method took up about 10% more Cr than the others and also took it up in a more basic form. I. D. C.

An investigation for the determination of the efficiency of liming and a comparison between calcium and barium treatment. F. CLOTOFSKI. *Collegium* **1922,** 347–50.—Hides by lime treatment lose 10–15% of their wt. of leather-forming substance. By treatment with $Ba(OH)_2$ satd. with hide powder the loss in wt. of leather-forming substance does not exceed 0.75%, and in the case of goat skin an increase in wt. of 1% was noted. C. T. WHITE

What chemical technology has done in the shoe-manufacturing industry. S. P. LOVELL. *Chem. Met. Eng.* **28,** 715–7(1923).—A description of the development of box toes and counters of pyroxylin and cotton-wool fiber to replace those made from sole-leather. *Diacetone alcohol* was introduced as a solvent for nitrocellulose in this process. E. H.

The estimation of fat in casein. G. T. BRAY AND F. MAJOR. *J. Soc. Chem. Ind.* **42,** 106–10T(1923).—A discussion of the various methods of detg. fat in casein. Best results are obtained when a 5-g. sample of finely ground casein is warmed with 10 cc. of water and 20 cc. concd. HCl for 40 min., with shaking from time to time. The acid liquid is then extd. with ether and the ethereal soln. dried over anhyd. Na_2SO_4. The solvent is distd. off, and the residue dried at 100° to const. wt. The residue is extd.

with gasoline, which is in turn removed and the residue dried as before. The resulting wt. of gasoline-sol. matter shows the fat content. Expts. show these results are very accurate. W. H. BOYNTON

The measurement of the color of tannin extracts (PROCTER) **2.** Silicate paint (for bronzing leather) (U. S. pat. 1,452,445) **26.**

30—RUBBER AND ALLIED SUBSTANCES

JOHN B. TUTTLE

Influence of soil upkeep on latex and rubber. O. DE VRIES. *Comm. Central Rubber Stat. Buitenzorg* **1922,** No. 31, 289–95.—No improvement was observable in the rubber from trees over a period of 3 months during which the ground was kept in good condition and free from weeds, after having been neglected for 12 months. J. S. C. I.

Latex and rubber from individual tress. III. Difference in properties of rubber from different trees. Are the properties of rubber from one tree constant? O. DE VRIES. *Comm. Central Rubber Stat. Buitenzorg* **1922,** No. 29, 146–62; cf. *C. A.* **14,** 3169; **15,** 450.—Twelve good-yielding trees, on one estate, gave from 9.6 to 68.4 g. of rubber per day. The rubber content of the latex varied from 25 to 46%, and although often very const. over long periods for one tree, sometimes underwent change from alteration in tapping system and other causes. For some trees the tensile strength of the rubber was consistently low. The rate of vulcanization was fairly const. for each tree and the "slope" in almost all cases fell between 35 and 38. Wide variations however, were found in the viscosity, which was not always const. for the same tree. J. S. C. I.

Investigation of the quality of plantation rubber conducted under the Ceylon rubber research scheme. IV. ANON. *Bull. Imp. Inst.* **20,** 431–57(1922); cf. *Bull. Imp. Inst.* **14,** 495(1916); *C. A.* **13,** 2150; **14,** 3821.—The expts. described gave the following results. Smoking sheet rubber for 3, 7, or 14 days had no appreciable effect on the time of cure or the quality of the vulcanized rubber. Rubber smoked for 14 days had the highest tensile strength (equal to the unsmoked control sheet). Smoked crêpe required slightly longer time to cure than unsmoked crêpe and had a slightly lower tensile strength (previous tests had shown considerable increase in time of cure and decrease in tensile strength). Crêpe rubber requires a longer time for vulcanization than the corresponding sheet, and thick crêpe usually cures more quickly than thin crêpe. The amt. of rolling which crêpe receives on plantations had no marked adverse effect on the rubber. The samples contg. most H_2O when rolled up cured in the shortest time. Crêpe rubber of good quality can be prepd. by allowing latex to coagulate spontaneously; and such rubber as a rule cures more rapidly than crêpe made by coagulation with AcOH. Rubber obtained by the Byrne process does not differ materially from that prepd. by the ordinary methods. Smoking sheet (from Culloden estate) for 3, 7, and 14 days gradually increased time of cure, and smoking for 14 days distinctly lowered the tensile strength. Air-dried crêpe made from "matured" coagulum required a shorter time of vulcanization, but the tensile strength was reduced if the coagulum was left in the serum for more than 3 days. In vacuum-dried crêpe the tensile strength of the sample left in the serum for 9 days did not differ materially from that of the control, but the time of cure had decreased. Wet creosoted rolls cured much more quickly than the control and had a higher tensile strength. The difference in the amt. of rolling of creosoted sheet previous to winding into roll had no effect on the rate of cure; but increasing the amt. of rolling increased the tensile strength. Rubber allowed to remain in a moist condition has a quick rate of cure and the presence of creosote does not prevent, but may lessen the effect on the time of vulcanization. Addition of $K_2C_2O_4$ to the latex decreased the time of cure without affecting the tensile strength; and addition of $CaCl_2$ decreased the strength without appreciably affecting the time of cure. Addition of old latex serum to the fresh latex reduced the time of cure without materially affecting the mechanical properties. Addition of NaOH to the latex before coagulating with AcOH increased considerably the time of cure and reduced the strength slightly. Creosoted sheet which was put through the rollers only once had a shorter time of cure and lower strength than the control. With wet creosoted sheet which was made into a roll, there is a further reduction on rate of cure, and the strength is equal to that of the control. Michi-Golledge worm rubber dried in hot air (temp. not stated) had

a much longer time of cure than control sheet and than air-dried Michi-Golledge crêpe from which the worm rubber was cut. The mechanical properties of the three were approx. equal. Sheets rolled together in pairs while wet (without creosote) had a shorter time of cure than the control sheet and the mechanical properties were practically identical. Wet roll had a still shorter time of cure and its mechanical properties were better than those of the control. The use of CH_2O as a preservative for the latex increases the rate of cure considerably but does not affect the mechanical properties; the min. amt. should be added, as the addition of 0.05% lengthens the time of cure to an undesirable extent. AcOH, HCO_2H, H_2SO_4, and HF all cause an increase in the time of cure when used in 4 and 8 times the min. amt., excess of AcOH being less objectionable than with the other 3. H_2SO_4 in excess has an adverse effect on the mechanical properties of the vulcanized rubber, but not the other 3. A. P.-C.

A bromide of rubber, and a method for the direct determination of the rubber hydrocarbon in crude and normal rubbers. M. PONTIO. *Ann. chim. anal. appl.* **5,** 39–42(1923).—See *C. A.* **17,** 1350. C. C. DAVIS

The nature of latex. M. M. MILLER. *India Rubber Rev.* **23,** No. 4, 498(1923).—A general description. C. C. DAVIS

Coagulation of rubber latex. L. LINDET. *Lait* **2,** 793–4(1922); cf. *C. A.* **17,** 900.—Latex is very similar in certain phys. properties to cow milk. It consists of a colloidal suspension of globules in greater number but of smaller diam. than in milk. Latex serum contains sugar, dissolved salts of the alkali metals especially phosphates, and amphoteric substances similar physically to casein. The ampholyte coagulates by the addn. of acids, certain salts, and by Ca ions. Alkalies and NH_3 prevent coagulation. Greater yield is obtainable from latex in the presence of Ca ions. H. F. Z.

Rubber latex and its industrial importance. A. VAN ROSSEM. *Chem. Weekblad.* **20,** 106–11 and 124–33(1923).—The use of rubber latex as an impregnating agent for fibrous materials is reviewed. The Hopkinson process of evapg. latex in spray-diffusers is described. R. BEUTNER

New process of vulcanizing rubber with ultraaccelerators. UGO PESTALOZZA. *Giorn. chim. ind. applicata* **5,** 15(1923).—P. claims priority (1918) in discovering the process of vulcanizing with ultraaccelerators as described later by E. Romani in *C. A.* **17,** 90. ROBERT S. POSMONTIER

Antimony sulfide and iron oxide as rubber compounding ingredients. E. ANDERSON AND W. M. AMES. *J. Soc. Chem. Ind.* **42,** 136–9T(1923).—A study of the accelerating and aging properties of golden Sb sulfide (*A*) and of Fe_2O_3 (*B*). Mixts. contg. brown substitute (*C*) were also tested because of the statement that *B* is an accelerator in the presence of *C* (cf. *India Rubber J.* **52,** 440(1916)). The mixt. smoked sheets (*D*) 85.5, S 9.5, *A* or *B* 5 was compared with the mixt. *D* 90, S 10, and the mixt. *D* 66.5, S 9.5, *A* or *B* 5, *C* 19 with the mixt. *D* 70, *C* 20, S 10. The relative rates of cure were detd. by the time of cure necessary for the mixts. to give a definite elongation under a definite load. The latter criteria differed for mixts. with and without *C*. *B* was not an accelerator in pure mixings, but *A* accelerated slightly. In the presence of *C*, *B* accelerated to the same extent as *A*, which was not influenced by *C*. Mixts. contg. *A* had superior tensile strengths to similar mixings contg. *B*. Aging tests were carried out at 70° for 1 week on mixts. similar to those above at several cures contg. 15% *A* or *B*, with and without *D*. Graphs show the elongations and breaking strengths as aging progressed. Mixts. contg. *B* did not age well, whereas those contg. *A* had good aging qualities. For all mixings, resistance to deterioration decreased with the time of cure. No essential difference was found in the aging properties of mixts. with and without *C*. C. C. D.

Rubber-seed oil (LOCKETT) **27.** Longitudinal elasticity and Poisson's ratio of India rubber (DEODHAR) **2.**

Rubber solution. W. B. PRATT. U. S. 1,451,711, Apr. 17. A rubber soln. which will pass through parchment and which is adapted for use as a coating is prepd. by digesting a mixt. of crude rubber and S with a solvent, such as oil of turpentine treated with oxalic acid, at a temp. of about 140–200°.